MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE. Assistant Editor: FRANK OWEN STETSON.

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The MONTHLY WEATHER REVIEW is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Anastasio Alfaro, Director of the National Observatory, San José, Costa Rica; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian, which is exactly five hours behind Greenwich time, is used in the text of the MONTHLY WEATHER REVIEW.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

THE RELATION OF THE WEATHER TO THE FLOW OF STREAMS.

By F. H. BRANDENBURG, District Forecaster. Dated Denver, Colo., August 30, 1906.

The conditions, meteorological as well as physical, affecting run-off are so many and so varied that it is probable that every stream has its own law. While precipitation is, of course, the foundation of stream flow, other meteorological elements, such as temperature, wind, and dependent influences, greatly modify effects. These subordinate influences may work in unison or separately, and the extent of their influence, whether favorable or unfavorable, depends on the resultant of their departures.

The water in the streams may come either from surface run-off or from ground water. Whether the precipitation comes as rain or snow depends, of course, on the time of year as well as on altitude and exposure, and the geographical position of the watershed. For the great interior basin and adjacent regions the snowfall constitutes the main source of supply, since about sixty per cent or more of the annual amount falls during the six months, October to March.

For high altitudes thruout the west the year may naturally be divided into two periods—the period of storage, October to April, inclusive, and the period of run-off, May to September, inclusive. The principal meteorological conditions, and conditions resulting therefrom, affecting storage are: total fall, time of fall (that is whether early or late in the season), the condition of the ground, the prevailing temperature, and wind action. The time of fall controls to a large extent the character of the late flow. Snow that comes in the fall or early winter is subjected to occasional high temperatures as well as to prolonged periods of low temperature. In time it becomes solidified and practically ice, in which form melting in summer is relatively slow. Later snows, altho much wetter, are not subjected to such low temperatures, and as the period of storage is shorter the snow never becomes so hard packed. With the coming of a warm spell melting is rapid, and a correspondingly large run-off results. The condition of the ground, whether wet or dry, is important, for when the rainfall during all or a part of the warm half of the year is below normal, ground water will be correspondingly low; so that when melting takes place much of the moisture held in storage on the surface will go to make good the deficiency. The condition of ground, whether frozen or unfrozen, affects the capacity of the ground to absorb moisture, and determines the proportion that appears as surface run-off, the unfrozen ground lessening the run-off during the early part of the season, and increasing the late flow by seepage.

Such high temperatures as occur during the storage period are not sufficient to cause a material melting at very high altitudes or in sheltered localities of less elevation. The effect of high afternoon temperatures is to cause the snow to settle, and as freezing weather prevails during the remainder of the twenty-four hours, solidification proceeds rapidly. Wind is a very important factor during the storage period. It is beneficial in packing the snow, and also in sweeping the snow into timber and other sheltered places. Wind, however, may become a detriment, as, for instance, when it partakes of the character of a chinook, or schnee fresser, as it is sometimes called from the fact that under its influence the snow disappears as by magic, leaving little or no visible moisture.

The period of run-off may be appropriately divided into two parts. The first and regular, as well as the more important, occurs in May and June, the time depending upon a joint effect on the one hand of the latitude and the elevation of the storage watershed, which are, of course, constant for a particular watershed; and on the other hand of the temperature, that is to say, whether the season is early or late, and whether days with abnormally high temperatures come in close succession, or whether there is a frequent alternation of short warm and cold spells. This early run-off is frequently due entirely to melting snow, and the amount of the flow depends on the extent and elevation of the area drained, as well as the depth and condition of the snow on the area. The late run-off will depend on the amount of the early and consequently solidified snowfall, the amount of ground water appearing as seepage, and the amount of rainfall. In many streams there is a secondary maximum due to rains; it generally occurs during the period of diminishing flow, and is common in the streams of the eastern and southern slopes. The rainfall of the interior basin in summer is generally too small to cause a second maximum. As compared with the run-off from melting snow, that furnished by rainfall is exceedingly variable in amount and time, and in general is much smaller. Owing to the occasional high intensity of local thunderstorms, a large pro-

portion of the water from such storms appears as surface flow, overflowing banks and causing damage in the vicinity of the storm area, but farther down stream it may be of decided help in increasing the available water supply.

As already noted, the rainfall in the great interior basin and thruout the northern Plateau is relatively small during the growing season, so that the run-off during late summer is supplied principally by ground waters, augmented somewhat by the melting of ice in sheltered spots at high altitude. On the southeastern slope, where the spring is almost rainless, the maximum run-off comes in May and the early part of June, but following the decline of the flow the rainy season sets in; sometimes it begins as early as July 1. Over many drainage areas of the eastern slope the amount of land under ditch is so great that the supply of water from melting snow becomes wholly inadequate in the latter part of the season, even when the snowfall of the preceding winter has been much in excess of the normal; for this reason the amount and distribution of the summer rains becomes a deciding factor.

Conditions that prevailed in Colorado several years ago furnish a good illustration of the principles enumerated. During the closing months of 1898 the snowfall along the Continental Divide and adjacent regions in Colorado was greater than had been experienced for many years. January, 1899, added 15 per cent and February a like amount, stormy weather being almost continuous, with plenty of wind to sweep the snow into the gulches and ravines. March, 1899, was even wetter than any of the four preceding months. As compared with the stupendous amounts that fell during that season, the next winter, that of 1899–1900, was dry, especially during January and March, tho October contributed a heavy fall, and February less than the normal amount for the region as a whole. It thus appears that the successive winters were notably different. The spring of 1899 was practically rainless, that of 1900 exceptionally wet. The summer of 1899 had slightly more than the normal precipitation, while the summer of 1900 was droughty. We now come to the water supply: the volume available on the eastern slope during the spring and summer of 1899 was inadequate, except for a brief period in June, notwithstanding the stupendous amount of snow that fell during the preceding winter. In 1900 irrigation enterprises fared better during spring and part of summer, despite the light snowfall of the preceding winter. The anomaly is explained by the fact that in consequence of the long, dry period which preceded the stormy winter of 1898–9, the ground was dry and unfrozen when the first snow fell, hence it absorbed a vast amount of moisture when melting began. The unusual dryness during spring played an important part, for, as is usual in droughty times, high winds, desiccating in character, were almost continuous, honeycombing the snow and causing a large proportion to disappear as if by magic. When the winter of 1899–1900 set in the ground was well supplied with moisture and frozen, as a rule, so that in the spring, which was notably free from high winds, the run-off reached the streams with comparatively little loss, and being augmented by seepage from the unprecedented fall of rain and melted snow during April (about ten inches) a most satisfactory flow was maintained until about the middle of July.

PHENOMENAL RAINFALL AT GUINEA, VA.

By E. A. EVANS, Section Director. Dated Richmond, Va., September 26, 1906.

On the 24th of August, 1906, there occurred at Guinea (P. O. Guineys), Caroline County, Va., a phenomenal fall of rain within a short period of time. Guinea is a station on the line of the Richmond, Fredericksburg, and Potomac Railroad [see *A* on the accompanying fig. 1], and the measured amount of rain of 9¼ inches in about thirty minutes was made there by Mr. W. M. Jones, foreman in the roadway department of this railroad, and by him reported to the President, Judge Wm. J. Leake, who subsequently placed the information in the hands of the writer. Mr. Jones is vouched for in the highest terms by his official superiors as a careful and accurate man, and has the confidence of all who know him.

Being much interested in establishing the facts regarding this enormous rainfall, I visited Guinea on September 3, and obtained the following information.

There were three measurements of rainfall made, one by Mr. Jones, in which instance the rain was caught in a tin bucket 9¼ inches deep and 8¾ inches in diameter, top and bottom. This bucket stood on a bench [*1*] in the yard and near the house [*B*] of Mr. Jones. The bench was 8 feet from the nearest part of the house and the bucket was about 20 inches above the ground. The exposure was such that only the rain falling from the sky could be caught. Mr. Jones states most positively that there was no water in the bucket before the rain set in.

The remaining two measurements were made [at *2* and *3*] by Mr. C. W. Tompkins, living about one mile north of Guinea. The first of these was taken from a wooden bucket 12 inches deep, 12 inches in diameter at the top, and 11 inches in diameter at the bottom, inside measure, and the last from two tin milk pails, 7½ inches deep and 11 inches in diameter, and 10 inches deep and 12 inches in diameter, respectively. These [two tin] pails had straight sides, were on the ground in an open pasture, and were placed one inside of the other.

The term "measurements" applies only indirectly, as there were no actual measurements taken at the time, the buckets being in each instance full and overflowing. The dimensions of the bucket at Mr. Jones's house were taken by the writer, while the dimensions of those at Mr. Tompkins's place were taken and reported by him. It is proper to say here that Mr. Tompkins is a man of standing in his community, and his responsibility is established and unquestioned.

Aside from the information furnished by Judge Wm. J. Leake, the details of this storm, as gathered by the writer, were obtained from various persons at Guinea, but chiefly from Messrs. Jones and Tompkins. They are as follows:

Weather before the storm very sultry, sky overcast, but not very threatening; thunder first heard about 4:30 p. m.; as the storm approached lightning became severe; rain began about 5:30 p. m.; about this time two heavy clouds met, one moving from the west, and the other from the northeast, and the rain immediately fell in torrents; according to Mr. Jones, corroborated by other witnesses, "it did not rain, but just poured down in solid sheets"; wind light; this condition lasted about thirty minutes, according to Mr. Jones—other eye witnesses make the time from five to ten minutes more—and then ceased, but light rain continued, ending about 6:30 p. m.; thunder last heard about 5 p. m.; the storm came from the west and moved almost due northward from Guinea; no rain of consequence fell 1½ miles east of Guinea.

Mr. Jones states that before the heavy rain ended he saw the railroad embankment, at a point marked *4* on fig. 1, beginning to wash away. He left his house to wire the railroad officials to hold trains, and passing by the bench on which the bucket first mentioned stood, he saw that it was full of water and running over. It continued raining very hard for some time afterward, according to his statement, and subsequently the second washout at the point marked *5*, on fig. 1, occurred.

After the rain, a work train was sent to the gravel bank at *D*, fig. 1, to get material to repair the embankment, but this track was under water and they could not get in. The washout had to be filled with cross ties, Mr. Jones stated.

Mr. Tompkins statement is as follows:

I was in my barn when the storm came up. It came from the direction of Guinea. Before I could get ready to leave the barn it was raining so hard that I was afraid to venture out. The storm lasted about forty-five minutes and after it was over I waded thru six inches of water on the level ground to get to my house [*C*]. In my yard on the north side of the house, but not adjacent to it, nor to any shed, was a wooden bucket [at *2*; the dimensions as previously given were taken subsequently at the request of the writer], which was full to the brim and running over. How much ran over I could not tell. I know the bucket was empty before the storm.

Just before the storm my sons started for the pasture to milk the cows. They reached the pasture about the time the storm came up, and ran to the house for shelter, leaving the pails on the ground in the field [at *3*], one being inside of the other. After the rain, when they went back, both inner and outer pails were full and running over.

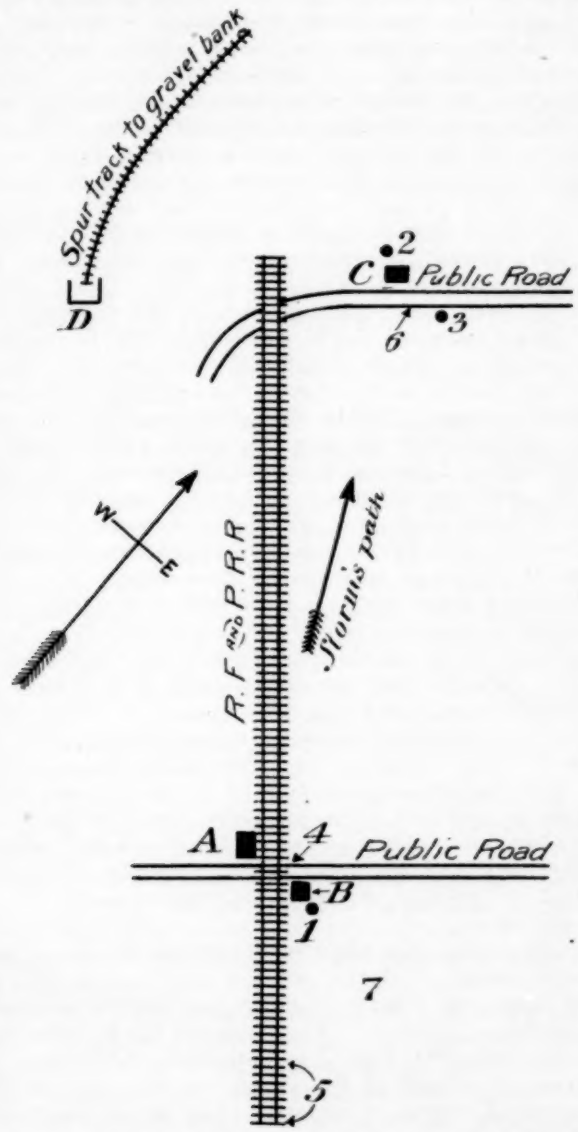

FIG. 1.—The immediate neighborhood of Guinea, Va., showing location of the washouts and of the exposed buckets.

Time did not admit the writer's seeing any of these buckets, or the points where they were exposed.

Collateral evidence of an enormously heavy rainfall was obtained from various sources. The most important instances are given in the following paragraphs:

From the railroad station southward, a distance of perhaps a quarter of a mile, the tracks run along the top of an embankment which is from four to eight feet high. The rainfall on this embankment submerged the rails, and was running off on either side. In less than an hour, and beginning at a point where a three-foot culvert passes under the track, about fifty feet of this embankment was washt out. Near the station [at *4*], a large hole was washt in the embankment under the north-bound track. At *6* the public road was washt out.

The posts of a fence inclosing a small meadow [*7*] on the east side of the railroad embankment mentioned, were submerged. These posts are from four to five feet high. The meadow is small and receives the drainage from, perhaps, ten or twelve acres of land.

An ordinary garden gate made of pickets, at the foot of the path leading from Mr. Jones's house to the public road, was torn from its hinges by the force of the water passing thru it. The ground falls somewhat from the house to this gate.

At the time of the writer's visit to Guinea, grass, weeds, and bushes still bore mud stains, and in one instance a high-water mark was noted on a small tree in the meadow just mentioned. The mark was about four feet above the ground.

By means of correspondence, an effort has been made to trace the path of the storm. This effort has been only partially successful, but has resulted in the establishment of the following facts, (see fig. 2):

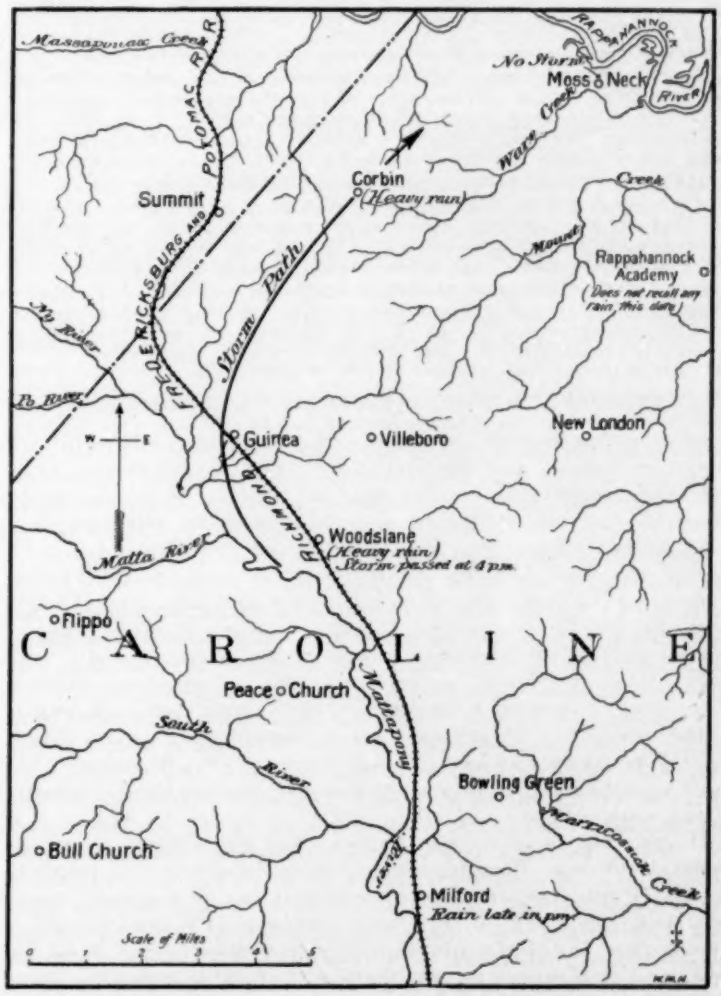

FIG. 2.—The region around Guinea, Caroline County, Va., showing where the storm was felt.

At 4 p. m. the storm passed over Woodslane, Woodford P. O., about four miles south of Guinea, accompanied by thunder and heavy rain. After leaving Guinea it turned northeastward, and passed over Corbin, a village about six miles northeast of Guinea, accompanied by heavy rain, thunder and lightning. The time at Corbin was not taken, but was late in the afternoon. The storm did not reach any point beyond Corbin.

It is interesting to note that on this date in an area extending from Milford, Caroline County, up the line of the Richmond, Fredericksburg, and Potomac Railroad, to Washington, D. C., numerous severe local storms occurred; and unusually heavy rains, accompanied by thunder and lightning, and in some instances high winds, were reported by the railroad station agents at Brooke and several other points, up to and including Washington, D. C. However, except at Summit, near Guinea, none of these storms can be connected with the Guinea "cloudburst" which, so far as can be ascertained, prevailed only within a very small area.

THE GREEN SUN OF THE KRAKATOA ERUPTION.

Referring to page 163 of the MONTHLY WEATHER REVIEW for April, 1906, wherein, speaking of the color of dust haze, the Editor states that the whiteness of the diatom dust in the harmattan is a diffraction phenomenon, produced by the action of minute irregular objects upon a beam of light, Prof. R. W. Wood remarks:

> The green sun observed thru the haze attending the Krakatoa eruption could never have been produced by diffraction, and I doubt if it is a thin plate phenomenon due to the passage of light thru the centers of small globules, as in the experiments of Prof. Carl Barus. I favor the explanation given by Prof. C. Michie Smith, in the Proceedings of the Royal Society of Edinburgh, Vol. XIII, page 116, where he says: "I have discovered that the green sun spectrum can be exactly represented by combining the spectrum of the sun seen thru a fairly thick mist and the spectrum of a moist atmosphere showing the rain bands strongly ".
>
> If plenty of water vapor will, by absorption, cut off enough of the red end, that is all that is necessary, as the rest of the spectrum would have a greenish appearance, which would be more marked if the violet and the blue were removed by haze. I should expect that sufficient water vapor would greatly cut down the red end, tho I am quite sure that no one has ever worked with a long enough column of dense water vapor to observe any coloring. Janssen worked with a column over a hundred feet long (a tube filled with steam at seven atmospheres), and observed a strong absorption of blue and violet. He attributed this to the vapor, but it is more probable that it was due to a haze of condensed steam. Why not work with an optical path of much greater length? A pressure of one hundred atmospheres could probably be used without trouble. But this experiment could not be done properly without very carefully constructed apparatus, the cost of which would be considerable.

INTERNATIONAL WEATHER CABLEGRAMS.

In accordance with arrangements between the Chief of the Weather Bureau and the director of the Central Physical Observatory observations from several Russian stations will be reported daily by telegraph and cable from St. Petersburg to the Central Office of the Weather Bureau at Washington. To begin with the 7 a. m., local time, observations at Irkutsk, Tomsk, and Ekaterinburg will be sent, the barometric readings and the direction and force of the wind only being reported by the use of the cipher weather code that will convey in one word for each station the information desired. The Chief of Bureau appreciates very highly the cooperation in the work of international meteorology of the Central Physical Observatory, whose general director, M. Rykachev, has done so much to stimulate studies into the general dynamics of the atmosphere.

It may not be generally known that for several years the Central Office at Washington has been receiving and publishing daily cable reports from three stations in Ireland, two in Scotland, one each in England, Germany, France, Portugal, the Azores, and Bermuda, and about twelve in the West Indies, and that since the establishment of cable communication with the Hawaiian Islands daily weather reports have been received from Honolulu. It will be of interest to know that preliminary steps for the inauguration of a similar service of reports from points in Alaska have been taken, and that with the completion and operation of the Iceland cable a daily service from that quarter is contemplated.

The extension of the area of daily weather reports is being made for the purpose of determining the relation and interrelation of barometric conditions over the oceans and the continents, and the discovery of this relation, that will undoubtedly be made by a study of the reports, will open the way for greater achievements in the accuracy and the period of weather forecasting.—*E. B. G.*

Mr. H. M. Watts, of the Philadelphia Press, in a recent communication to the Philadelphia Academy of Natural Sciences, pointed out that a new epoch in meteorological research is about to dawn, in that the Weather Bureau is soon to receive daily telegraph and cable reports from new regions of the Northern Hemisphere, which are meteorologically very important. In explaining the significance of this Mr. Watts went into a careful survey of the great basic causes of variations in weather and climate. The variations in solar radiation appear to have some effect on the great permanent anticyclones, whose slight changes of intensity and location so greatly affect the paths of storms.

Furthermore, Mr. Watts called attention to the fact that at Mount Weather the Bureau will prosecute studies of the variations in all the solar functions, in connection with researches in the elements of the earth's atmospheric envelope.

THE ZODIACAL LIGHT.[1]

By Prof. ARTHUR SEARLE. Dated Harvard College Observatory, Cambridge, Mass., October 1, 1906.

The prolonged and careful series of observations of the zodiacal light made by Mr. Maxwell Hall, which appeared in the MONTHLY WEATHER REVIEW for March, 1906, Vol. XXXIV, p. 126, forms a welcome addition to our previous information. Its value is increased by the circumstance that the observer was apparently free from any prejudice which might have resulted from a too extensive acquaintance with the work of other inquirers into the same subject. Observations of the zodiacal light are certainly best made without much knowledge of what has been the experience of others. When deductions are to be made from such observations, however, the student should know as much as possible about the existing material for discussion.

Unfortunately, it has hitherto been customary for each observer to draw his own conclusions almost exclusively from his own observations, and the consequence has been the production of a considerable mass of speculation tending rather to encumber than to assist the progress of definite research. In the present article all reference to theories of the zodiacal light will be avoided. Its purposes are—First, to bring together some facts which seem to be of interest, in view of Mr. Hall's work, and of the editorial comments which follow it; Second, to present suggestions which may be of use to future observers.

The question whether the altitude of the observer's station affects the visibility of the zodiacal light is raised in the editorial comments just mentioned, and seems capable of a fairly conclusive answer. The altitude of Mr. Hall's own station was only 1800 feet; but he quotes observations made by Professor Newcomb in Switzerland at the altitude of 8000 feet. Some additional records of observations made at considerable altitudes are given below.

1. Alexander von Humboldt: "Cosmos", English translation by Otté, published in Bohn's Scientific Library, London, 1849. Volume I of this work, at page 126, contains this passage relating to the zodiacal light:

> I have seen it shine with an intensity of light equal to the milky way in Sagittarius, and that not only in the rare and dry atmosphere of the summits of the Andes, at an elevation of from thirteen to fifteen thousand feet, but even on the boundless grassy plains, the Llanos of Venezuela, and on the seashore, beneath the ever clear sky of Cumana.

Humboldt seems, by this statement, to have presumed that the zodiacal light would be best seen at great elevations, and actually to have found that it was seen at least as well from the tops of mountains as at lower levels. His South American journeys were made in the years 1799–1804.

2. C. Piazzi Smyth: "Report on the Teneriffe Astronomical Experiment of 1856, London and Edinburgh, 1858". During the months of July, August, and September, 1856, Smyth made

[1] As this article by Prof. Arthur Searle definitely settles the old question as to whether the zodiacal light and gegenschein are atmospheric or celestial phenomena, we shall hereafter commend the publication of such material to the astronomical journals, and reserve the columns of the MONTHLY WEATHER REVIEW for meteorology proper.—EDITOR.

observations of various kinds from stations on the peak of Teneriffe. The altitude of one station, Guajara, was 8903 feet; that of another, Alta Vista, was 10,702 feet (p. 476). At both these stations the zodiacal light was well seen (p. 490); at Alta Vista (p. 491) it was slightly visible even at 1 a. m.

3. G. Jones: "Observations on the Zodiacal Light at Quito, Ecuador, with deductions".[3] Jones observed from the hill Ychimbia, near Quito; the altitude of the town itself is given as 9520 feet in the Encyclopedia Britannica. The observations were made in the eight months following August, 1856, beginning about the time when those of Smyth ended. Jones found at this station that everything distinctive in any celestial phenomenon, undoubtedly meaning by this expression to include the zodiacal light, was brought out with a distinctiveness he had never before witnessed (p. 375). He was able to trace the light quite across the sky in the form of a zodiacal band, which he saw afterwards even at lower levels. A plate accompanies his article, from which it appears that the ascending node of the central line of this band was at about 60° of celestial longitude.

4. A. E. Douglass and others: "Positions of Gegenschein."[3] The observations here given relate only to gegenschein; but the zodiacal light in general is known to be remarkably conspicuous at Arequipa, where these determinations were made. The altitude of the station is 8043 feet.[4] The dates of the observations are in the years 1891 and 1892.

5. E. Marchand: "Observations de la lumière zodiacale, faites à l'observatoire du Pic du Midi.[5] The altitude of the barometer of the Pic du Midi Observatory is 2859 meters (about 9380 feet) according to Rotch.[6] Marchand's observations were made in the years 1892–1895. Like Jones, he was able to trace a zodiacal band across the sky. He makes the longitude of the ascending node 70°, a result in pretty good agreement with that of Jones.

6. Mr. Innes, of the Government Observatory, Johannesburg, South Africa, has recently stated in a letter kindly forwarded to me by Professor Abbe, to whom it was addrest, that "at Johannesburg, 5925 feet altitude, the zodiacal light is always distinctly visible on clear, moonless nights. The gegenschein is also to be seen, unless its position should happen to be too near the milky way or near a bright planet, but it is never conspicuous".

The evidence above quoted seems to place it beyond doubt that a great altitude is at least no hindrance to observations of the zodiacal light. Of course, at any particular station, local circumstances may tend to produce slight condensations of vapor which may obscure faint celestial phenomena. But however clear the sky may be at a given station, we can not expect that an observer not personally interested in the subject, but merely looking at the zodiac as a matter of routine, should notice anything there to be recorded. When a pictorial representation is made of the zodiacal light, as in the plate accompanying Mr. Hall's article, it necessarily appears as a conspicuous object, with well-defined boundaries. In fact, however, it is always very indefinite, and altho it may be easily perceived by any one who takes the trouble to compare carefully the relative degrees of brightness shown by different parts of the sky, it seldom attracts the attention of the casual spectator. The first requisites, then, for an observer of the zodiacal light, are interest in the subject, patience, and perseverance.

The indefinite character of the light to be observed not only prevents its customary recognition, but makes it difficult to obtain any satisfactory comparison between the various reports of observers, all of whom may be equally careful and competent. It is highly desirable that future observers should agree upon some definite system of procedure which may make their results readily capable of combination. It may be worth while, therefore, to repeat here a suggestion made on former occasions (for example, in Appendix B to the "Laboratory Manual in Astronomy" by Mary E. Byrd, Boston, 1899) that, instead of drawing boundaries incapable of definition, observers should always draw contour lines, that is, lines along each of which the light is thought to have everywhere the same degree of brightness. This degree should be defined, by comparison at the time of observation, as that equal to the brightness of some small stated portion of the sky, not affected by the zodiacal light. This, of course, will usually be situated in or near the milky way.

Contour lines of the kind just proposed are most conveniently drawn by covering a map of the stars with a piece of tracing paper, and marking upon it the places of a sufficient number of stars to ensure the replacing of the paper in the same position at any future time. A contour line drawn upon the paper can thus be definitely located by the observer when he has time for the study of his observations. It is usually impracticable to draw small parts of such a line by successive observations, because the eye needs time, after any record has been made, to recover its sensitiveness, and meanwhile the diurnal motion of the stars, not to mention other causes, will change the conditions of the observation. As much of the line as can be decided upon must be drawn at once, with a record of the time of the observation, and any further work must be treated not as a continuation of that observation, but as one entirely independent of it.

At present we know scarcely anything of the degree to which observations of the zodiacal light are affected by the personal peculiarities of observers. Accordingly, it is much to be desired that more than one observer, at any given place and time, should carry on the work. The observers should agree upon some one point of a proposed contour line, and then proceed to make their simultaneous observations entirely independent in all other respects. It has been found by trials of this kind that contour lines thus drawn by two observers, altho necessarily coincident at the selected point, deviate from each other in places as much as five degrees. But, as has been remarked in the Appendix above mentioned, observers should not be discouraged by discrepancies of this kind, for until it is known how much difference may be expected between results obtained at the same place and time, it is evident that we shall have little satisfaction in comparing observations made at different stations and in different years.

The zodiacal light has sometimes been regarded as subject to comparatively rapid changes in brightness, occurring within a few minutes of time. Even when these changes appear to be verified by simultaneous comparisons with portions of the milky way, we can not be certain that they are real, unless two or more persons, observing wholly independently, should report them as occurring at the same time. So far as is known, this experiment has never been tried.

A possible source of error in observations of the zodiacal light in general, and of gegenschein in particular, is the presence in portions of the zodiac of faint bands of permanent light, due presumably to aggregations of small stars, and in that case to be regarded as faint branches of the milky way. Every observer intending to make useful observations of the zodiacal light should study the zodiac, and also the sky for a considerable distance on each side of it, at times when little or no zodiacal light is visible there, in order to make sure that in his later observations he is not confounding permanent with transient phenomena.

[3] American Journal of Science and Arts. Second Series, Vol. XXIV, pp. 374–385, November, 1857.

[3] Annals of Harvard College Observatory, Vol. XXXIII, p. 16.

[4] Annals, etc., Vol. XLVIII, p. 273.

[5] Comptes Rendus des Séances de l'Académie des Sciences. Tome 121, p. 1134. Paris, 1895.

[6] Mountain Meteorological Stations in Europe, p. 31. Ann Arbor, 1886.

It can scarcely be necessary to add that transient phenomena of other kinds, such as bands of auroral light at periods when auroras are frequent and intense, sometimes appear in the zodiac, and are mistaken for zodiacal light by inexperienced observers.

THE DIRECTION OF LOCAL WINDS AS AFFECTED BY CONTIGUOUS AREAS OF LAND AND WATER.

By T. H. DAVIS. Dated West Haven, Conn., July 21, 1906.

Thru my previous researches on local surface wind direction I have been led to believe that, so far as stations near large water areas are concerned, a large percentage of observed directions is due to the direct influence of contiguous land and water. For this reason I have continued my research in this line, selecting such stations as seem to be open to direct sea or lake winds. My computations have been somewhat voluminous, but I have endeavored to condense them so that the results can be studied without extensive explanatory matter.

For each station I have taken those winds which blow from the cardinal points, the paths of which have free ingress to the land, and the principle upon which I have based the study of the data is that of land and sea breezes. These appear to me to be much more extensive and to exert greater influence on local directions than is generally supposed or admitted. I strongly believe that winds of this character should receive greater consideration than hitherto, as valuable factors in the determination of local weather.

I have found, during the comparatively short time in which I have obtained continuous tracings of directions from a vane well exposed near the coast, what I believe to be indisputable proof of wind direction altogether independent of that which precedes, accompanies, or follows the passage of great areas of high or low pressure to the north or to the south of this point. It may be argued that all local winds are entirely the result of highs and lows, and that such as I have observed are simply averages of the effects of these areas. On the other hand I am led strongly to believe that a large percentage of winds over stations near large water areas is mainly, if not entirely, due to land and water contiguity. Careful study of weather maps will show how very frequently, over the Great Lakes and along the coasts, the winds of highs and lows are deflected.

The records of winds by only eight cardinal points do not constitute entirely satisfactory data for research. I believe that the scale of sixteen points should be used; this I did in former years when observing for the British Meteorological Office and am doing now at my own station. The results given in this paper are, however, from eight point observations, as recorded in the MONTHLY WEATHER REVIEW for the several years under consideration. Some of these in the earlier years seem to be not quite so correct as could be wished, particularly as to the large number of calms recorded for some of the stations. In my computations I have eliminated all these calms by adding them, proportionately, to those winds showing the greatest frequency.

In order that the results obtained should be as comprehensive as possible the following exposed stations were selected as representating the Pacific and Atlantic coasts, the Gulf of Mexico, and the Great Lakes:

San Francisco, Cal	Pacific coast.
San Diego, Cal	
Galveston, Tex	Gulf of Mexico.
Savannah, Ga	Atlantic coast.
New York, N. Y	
New Haven, Conn	
Boston, Mass	
Eastport, Me	
Marquette, Mich	Great Lakes.
Chicago, Ill	
Cleveland, Ohio	
Toronto, Ont	

I should much have liked to include several other stations, but not possessing the necessary information was unable to do so.

The results subsequently shown were obtained by tabulating from the records in the monthly reports as published by the Weather Bureau, the actual number of hours the wind blew from those points over the water areas, from which it had an unobstructed path to the land. This was done for each point, each month for twelve successive years, 1891–1902. The total of each column was divided by twelve to obtain an average number of hours for each point in each month and from this their percentages were determined to the first decimal point.

For example:

San Francisco, January, hours.

Year.	W.	SW.	W.+SW.
1891	94	78	172
1892	133	75	208
1893	117	43	160
1894	79	184	263
1895	32	129	161
1896	56	99	155
1897	46	12	58
1898	77	33	110
1899	97	59	156
1900	44	24	68
1901	126	33	159
1902	97	19	116
Total	998	788	1,786
Average	83	66	149
Percentage	11.2	8.9	20.1

This table will serve as a general explanation of the method adopted for computation of results for each station selected.

In this paper I have restricted my observations to the winds flowing from seaward points to the land, as these seem to be more marked than those from land to sea, by reason, no doubt, of the more marked effect of the intensity of insolation. The monthly and annual variation of this intensity very probably accounts for the variability in the frequency of true sea winds in the earlier and later months of the several years under consideration, for while the accompanying tables of average percentage indicate considerable regularity in the change of prevalence of the sea winds from January to July and August, and from these months to December, yet each individual month during the 12-year period, in most cases, shows considerable variation in frequency. But the total number of sea winds for each year of the same period does not show any very great variation, at any rate not more than what may be expected from the effect of average insolation for each year.

In two or three cases I endeavored to make comparison between the frequency of sea wind and the mean annual temperatures during the whole period, but was unable to discover any reliable relation. This really may be expected, because, after all, the conditions of insolation are such that it does not necessarily follow that intermittent hot periods should produce those atmospheric effects which are induced by superheated land areas.

The determination of sea and land winds is complex because of the difficulty of quantitatively separating actual sea winds from the total winds composed of these and of those which are the effects of high and low areas. This I believe to be too abstruse at present for any attempt at separation to be made, but I do believe that the result of my research indicates pretty clearly that the percentages do actually prove a large frequency of true sea winds blowing independently of any other atmospheric condition, because of the regular progression of the figures from winter to summer and the same regular recession from summer to winter. If it were possible to eliminate the influences of high and low areas I firmly believe that percentages would be found showing pretty perfect progression and recession without any pronounced variability.

In referring particularly to the actual numerical results obtained I may remark that, in order to obtain the sea directions, lines were in each case laid off on a reliable map showing the true paths of winds from the sea, and then a careful study was made of the recorded hourly frequency. The latter enabled me to select those winds which I believed were absolutely influenced by the effect of the contiguity of land and water and the directions so determined are given in Table 1.

TABLE 1.—*Directions of effective sea winds referred to in text.*

San Francisco, Cal.	West, southwest.
San Diego, Cal.	West, southwest, northwest.
Galveston, Tex.	East, southeast, south, southwest.
Savannah, Ga.	Southeast, south.
New York, N. Y.	Southeast, south.
New Haven, Conn.	Southeast, south, southwest.
Boston, Mass.	Northeast, east.
Eastport, Me	South, southwest.
Marquette, Mich.	North, northeast, east.
Chicago, Ill.	Northeast, east, southeast.
Cleveland, Ohio.	Northeast, north, northwest.
Toronto, Ont.	East, southeast, south, southwest.

TABLE 2.—*Average monthly percentages of sea winds for twelve years, 1891–1902.*

Month.	San Francisco.	San Diego.	Galveston.	Savannah.	New York.	New Haven.	Boston.	Eastport.	Marquette.	Chicago.	Cleveland.	Toronto.
January	20.1	45.2	51.9	11.7	12.2	21.9	8.4	15.0	11.0	19.5	23.3	38.0
February	41.3	55.2	55.0	17.3	10.5	19.9	14.2	16.8	21.2	24.3	30.3	33.6
March	58.1	63.1	67.5	28.5	17.3	28.4	19.4	25.1	32.0	36.7	37.8	33.9
April	71.9	74.0	77.0	35.0	23.5	37.3	28.0	27.9	38.3	46.4	41.6	40.0
May	81.2	79.0	81.7	40.2	28.5	49.0	29.3	44.5	35.0	44.5	42.9	43.9
June	89.0	90.4	85.7	42.5	30.0	50.0	26.9	47.5	33.5	47.3	39.8	46.0
July	91.2	85.9	86.4	33.2	32.3	50.7	21.1	57.1	31.9	46.0	38.3	48.7
August	90.7	86.5	79.2	34.1	30.7	43.2	22.7	47.3	34.5	50.1	41.9	44.5
September	82.8	79.1	65.5	26.9	28.0	37.0	20.4	42.6	20.1	34.8	34.2	43.0
October	66.4	63.2	60.0	14.8	18.0	28.7	19.1	32.2	21.8	29.3	27.6	42.6
November	38.5	48.5	58.1	16.1	15.6	23.0	11.9	24.6	15.1	24.6	22.4	41.0
December	18.3	36.7	51.5	15.9	12.6	27.8	7.4	20.6	11.1	20.6	19.6	47.1

Each column of figures gives the average percentage of winds from sea to land for each month, based on data for the 12-year period, 1891–1902. While the figures in Table 2 show results pertaining to sea winds, it must not be supposed that they represent those winds for each month of each year. Individual months show, in the records, considerable irregularity and variation in cardinal point direction, especially in the early and later months of the year.

A very good example of such variation occurs in the case of San Diego, Cal., where the records show a considerably larger proportion of west winds in the first half of the 12-year period than in the second half, and a closely corresponding larger proportion of north winds in the second half than in the first. I find there is a sort of reciprocity among the winds blowing in from the sea, for, as the percentage frequency decreases from one point it generally increases in one of the others in fairly relative proportion. A similar variation in frequency is apparent in the San Francisco, Cal., records, and I particularly noted in those for 1893–4 a great recession of west winds and increase of southwest; also, that during the whole of the 12-year period there were considerable oscillations between west and southwest. In all the Januarys and Decembers there are marked variations in the totals of west and southwest winds, while in all the other months their total frequencies are much more equal.

Referring again to the total frequencies of sea winds for each year, for San Francisco, my computations prove a remarkable regularity, for, with the exception of 1893, the sea winds comprised from 61 to 65 per cent of the total winds blowing over this station, thus showing an average annual variation of only 4 per cent for the whole period. In 1893 the percentage of sea winds showed only 56 per cent, and this probably may be accounted for by errors of observation or some numerical error. I am not inclined to look upon it as by any means normal.

The frequencies of sea winds for San Diego do not show such marked regularity as those of San Francisco, for their annual variation was from 61 to 76 per cent, the former representing 1891 and the latter 1902. This, however, may be considered as not an excessive variation. I mention these two stations, in particular, in support of the fact that the largest proportion of winds blowing from the sea is due to causes entirely independent of general high and low pressure; that such winds are material factors in determining the climate of coastal positions; and that, by reason of the results obtained numerically from actual observations of definite conditions, they prove the value of the method, which I can not help believing to be far more practical and useful than the mathematical and dynamic theories with their voluminous calculations intended to foretell and explain such atmospheric phenomena. Every natural law, when discovered, is found to be entirely simple, and to my mind it seems that close and faithful observation of the actual workings of nature should produce more true scientific results than those sought for by the aid of trigonometric functions, the calculus and such like. These are, no doubt, valuable in the analysis of a law, its conditions and effects, after its discovery.

Taking Galveston, Tex., as a representative station for the Gulf of Mexico, we find the winds blowing from the Gulf over this place very well defined and in quite large proportion; also, that there is very little variation of the totals of these winds during each corresponding month in the whole twelve years. The entire variation of totals for each year is from 66 per cent in 1901, to 71 per cent in 1904, a range of only 5 per cent during the whole period. Galveston being a station where winds with easterly components would be expected to predominate, as a result of trade-wind effect, might not be considered an altogether satisfactory place for the determination of those winds flowing in from the Gulf as a result of land and water contiguity; but it seems to me that the percentage of Gulf winds maintains great regularity of increase and decrease at those seasons of the year when they would be actual results of such contiguity. Moreover, an analysis of true Gulf wind direction shows for the average year 10 per cent of direct east winds, 28 per cent southeast, 20 per cent south, and 10 per cent southwest. The last two directions can hardly be considered as having direct connection with trade-wind effect. Furthermore, the maximum frequency of direct east wind occurs during September, October, and November; of the southeast, from March to October; of the south, from April to August, and of the southwest during June, July, and August. I believe we can draw the same deductions from the Galveston record of wind frequency, with relation to Gulf winds, as were drawn in the cases of San Francisco and San Diego.

Turning now to the Atlantic coast, Savannah, Ga., was the most southern station selected. At this place, which shows only 26 per cent sea winds for the average year, there was a considerable variation of total annual sea winds during the 12-year period. The lowest percentage was 17 in 1902, and the highest 34 in 1894, giving an average of 17 per cent.

Savannah is somewhat unsatisfactory as a representative station, because there are some *topographical* features that might interfere with some of the sea winds, but this was the only southern coast station for which I possessed unbroken hourly records. From an analysis of the winds from each point it would appear that there is a gradual mean increase of southeast and south wind frequency from a minimum in January to a maximum in June, and thence a gradual recession from July to December, with a slight fluctuation in August and again in November. It was also found that the south winds predominate on the average in each month except September and

October, in which months southeast winds predominate, and November, when south and southeast winds are practically equal in frequency. The actual southeast and south sea winds for each month during the 12-year period are very variable, except in the months of May, June, and July, in which they show comparatively more regularity.

New York, N. Y., receives sea winds from south and southeast, which, however, must be somewhat interfered with by reason of the irregularity of the coast. Southwest winds are frequent during some of the summer months, blowing in from the direction of upper New York Bay. They are, however, so irregular and intermittent that I have not looked upon them as really sea winds. New York is not a station where we may look for very definite evidence of the effect of land and water contiguity, still it is so to some extent. At this station the total sea winds for the average year constitute 22 per cent, the variation being from 18 per cent in 1896 to 28 per cent in 1891, giving a range of 10 per cent.

New Haven, Conn., I believe to be a very fairly representative east coast station, for it is well open to the extensive waters of Long Island Sound from east-southeast, thru south to west. The water area is uninterrupted for a space of about sixteen miles. Winds direct from the Atlantic Ocean are more or less interfered with by the land effect of Long Island, which, however, is only very moderately elevated above the water surface; but, the width of this land in the path of those winds direct from the Atlantic to New Haven, being 14 to 18 miles, must have a deterrent effect on winds passing over it from the ocean direct. This is evidenced by the frequent appearance of more or less cumulus clouds directly over the Long Island land area, and it seems to me that we, in New Haven, are practically dependent upon the water area of Long Island Sound for our sea wind.

The average year shows a frequency of 6 per cent southeast, 11 per cent south, and 18 per cent southwest winds, the total sea winds from these directions being 35 per cent. This percentage shows very small variation, the lowest value for the period being 32 per cent in 1899 and the highest 39 per cent in 1891, the range being only 7 per cent during the whole twelve years. The average of 35 per cent was exceeded slightly in 1891, 1895, 1896, 1901, and 1902, and not attained in 1892, 1893, 1894, 1897, 1898, 1899, and 1900. Taking advantage of the local Weather Bureau records I made what I believe to be a very careful comparison between the range of air temperature and the frequency of sea winds; but, again, I could find no reliable relation between general temperature means and percentage of these winds. This, in all probability, is because the air temperatures were taken at an elevation of about 118 feet above the ground, and were, therefore, those of the air resulting from land and water interchange. More careful study and closer thermometrical observations near the surface of the land area at a few selected points, together with synoptic temperature records of contiguous water might show clearer connections between sea winds and selected temperatures. This I hope to work out in a subsequent paper at a later date.

I have so far been unable to find any records of the temperatures of the Long Island Sound waters near the surface. I have obtained records of deep water temperatures which Messrs. Landcraft Bros. kindly furnished, showing for the month of July in 1903, 1904, and 1905, 60° to 70°. These were taken at depths of five to six fathoms below the surface, and it is extremely doubtful if such temperatures would correspond with that of the water surface, which I think is the only datum that would be of any service in determining the relation between the temperature of the water, that of the air in contact with it, and that in contact with the adjacent land area. Probably some such system may be arranged so that results can be obtained which would clearly define the information sought.

Taking the sea winds flowing into Boston, Mass., I found, for this place, conflicting conditions and considerable monthly variation and irregularity during the twelve years. The individual months show that from May to September, both inclusive, the greater percentage of sea winds is from due east and in all the other months (except April, in which east and northeast are comparatively equal), from the northeast. It seems to me that many of the true sea winds for Boston are obscured by those arising from other causes, and they seem to suffer deflection by reason of the complex coast line and probably by the influence of the large outer bay. I quite expected to find southeast winds showing themselves as seasonal sea winds as related to this bay, but on computing these I found the percentage for the average year to be practically equal in each month, the variation being between 3.3 per cent in February, and 6.7 per cent in August, the remaining months showing a percentage between 4 and 5. For these reasons I did not include southeast winds in my computations. The total sea winds for Boston, so far as I can ascertain from the records, amount to only 19 per cent in the average year, and they varied during the twelve years from 16 per cent in 1892 to 23 per cent in 1898, the range being 7 per cent. Of the above total sea winds, 9 per cent were from the northeast and 10 per cent from the east, the former varying from 4 per cent in January and December to 14 per cent in April and May, and the latter from 7 per cent in December to 27 per cent in May.

The geographical position of Eastport, Me., renders this place liable to variability and fluctuation of sea-wind frequency. The coast line is much broken and the outlying insular land areas probably have their influence in modifying direction. In my computations for Eastport I found that the south and southwest winds were those exhibiting the seasonal progression and recession in frequency, and that these were practically the sea winds for this place. Observing that Eastport should theoretically receive northeast, east, and southeast winds resulting from sea and land effect, I computed these directions separately. The northeast sea winds appear to flow inland down the coast from the Bay of Fundy mainly during those months when it is more or less frozen over, and seem to continue doing so until the latent heat of liquefaction vanishes and the water begins to absorb heat specifically. These winds appear almost twice as frequently from January to June (both inclusive) as they do during the other months, with the exception of November, in which month they about equal the figures from January to March. The east winds seem to blow pretty exactly with the same relative frequency as the northeast winds themselves, while those from the southeast appear pretty regular in frequency (but in very small percentage) thruout the whole average year. The south and southwest winds show considerable seasonal regularity in the average year, ranging from 15 per cent in January to 57 per cent in July, thence to 21 per cent in December. The total average percentage of these sea winds is 33.4, their variation being between 27 per cent in 1901 and 39 per cent in 1895, a range of nearly 12 per cent during the whole period. If we include the winds from northeast, east, and southeast then the total percentage of sea winds for the average year reaches 54.1; but I believe the former percentage to be more correct. I believe that many of the recorded observations of winds blowing over Eastport are winds related to other causes than those producing true sea winds; yet there is, to my mind, quite enough observational evidence of the seasonal increase and decrease in frequency of winds from the water area to substantiate the existence of a fair percentage of true, independent sea winds.

The results of the computations of the frequency of winds flowing in from Lake Superior to Marquette, Mich., show some very interesting features, in which the ice-covered lake in winter, and ice-cold water of early spring seem to have

direct effect in influencing definite lake winds, which seem more marked during the period of the breaking up of the ice in April and May than in any other seasonal period of the year, excepting the month of August, in which a large percentage would be expected by reason of the greater effect of solar radiation on the land area. An analysis of frequencies from the lake-wind points for the average year shows 12.6 per cent north, 9 per cent northeast, and only 3.9 per cent east. Winds directly from the east do not seem to contribute much to the total of lake winds, which for the average year is 25.5 per cent. The variation for the twelve years was between 20 per cent in 1901 and 1902 and 33 per cent in 1892, giving the rather large range of 13 per cent. The minimum percentage occurred in the last three years, 1900–1901–2.

Chicago, Ill., appears to exhibit very definite lake winds which show very fair seasonal progression and recession during each year of the whole period, with the exception of 1895 and 1896, in which years the total of lake-wind hours is much less than in the other years. The average year shows, from my computations, a total of 34.7 per cent lake winds. Here again I ventured a comparison between the winds and the mean pressures and temperatures, at Chicago, over the 12-year period, but obtained no result that would lead me to believe otherwise than that the number of hours of frequency of lake winds, as recorded in the MONTHLY WEATHER REVIEW, is not the result of general pressures and temperatures and that wind directions certainly are in very large proportion due entirely to local influence; and that, generally, they are quite separate from general circulatory effect, or that resulting from the passage of high and low areas over this point. This assertion, which applies to all such winds from water areas flowing unobstructed to the land, may seem to be a bold one, but it is the result of careful study and research into the recorded frequencies for the period under consideration. An analysis of the frequency of each wind for the average year for Chicago shows 17 per cent northeast, 7 per cent east, and 11 per cent southeast. The total lake winds for each year vary between 27.6 per cent in 1896 and 39.7 per cent in 1892. The average total for the twelve years is 34.7 per cent and the range of variation 12 per cent.

Cleveland, Ohio, is another lake station exhibiting good seasonable evidence of true lake winds. These amount to a total of 33.3 per cent for the average year, the variation being between 29 per cent in 1894 and 41 per cent in 1891, thus showing a range of 12 per cent. Of the total 33.3 per cent lake winds for the average year, 10.6 per cent were from northeast, 9.6 per cent from the north, and 13.1 per cent from the northwest.

Toronto is the only Canadian station the records of which seemed continuously reliable. My computations in this case are based on the reduction of observations to whole days, from which the percentages are calculated. I could see no other way, owing to some irregularity in the recorded hourly frequencies as published in the Canadian Monthly Weather Review.

The total lake winds for this place, for the average year, form 41.9 per cent. Of this total 13.1 per cent were east and 5.3 per cent southeast, both directions showing regular seasonal progression. The south wind, 10.9 per cent, and the southwest, 12.6 per cent, altho really lake winds do not show such seasonal regularity as do the east and southeast, and this particularly in the case of the southwest wind, the frequency of which is high in January, June, July, November, and December, while the other months are fairly equal in frequency, about 9 per cent. This would indicate winter lake effects similar to those of Marquette.

In order that this research should be as complete as possible—so far as I could judge—I calculated the resultant direction of the sea winds for each selected station, for each month of the average year. These results are given in Table 3, which shows, generally, how very closely the resultant direction persists at nearly all these places, adding, I believe, further and strong proof of the existence of a large proportion of winds due to land and water contiguity. The great importance of these, as affecting local climate surely deserves more careful consideration. Usually these winds are merely mentioned meteorologically and dismissed with comparatively short notice, conveying the idea that they are unimportant.

From a review of this paper the following may be deduced:

(1) That winds from large water areas are much more frequent on the Pacific coast and on the east coast of the Gulf of Mexico than they are on the Atlantic coast or the Great Lakes.

(2) That these winds have more persistent frequency than generally supposed.

(3) That they are important factors in determining local climate.

(4) That while they vary much in direction in individual months their annual frequency does not depart very far from the average.

(5) That while they may be, to some extent, overcome by winds from other causes, yet their existence and importance can not be doubted, and that they are true results of land and water contiguity.

Before commencing this research and during the time I have been engaged upon it, I have refrained from perusing any publication bearing upon the subject, as my desire was that it should be entirely independent and unbiased. I have relied altogether upon the information contained in those tables, published in the MONTHLY WEATHER REVIEW, which give records of the number of hours of wind frequency, and the whole of my computations are based on these.

I do not venture explanation of theory or hypothesis relative to the actual cause or causes of the winds blowing from large water areas, my endeavor being to make a statement, as clearly as possible, of actual occurrences, and I believe these to be stronger evidence of atmospheric phenomena than could be the case with theoretical or hypothetical reasoning.

NOTE.—During the short time in which I have obtained continuous tracings of wind direction, very near the coast line, I have noticed many definite changes in direction at, or near to, the times of the high and low water. I am making specific record of these and propose making the relation of change in some wind directions to tidal effect the subject of a paper at some future date.

TABLE 3.—*Resultant direction of sea winds for each month of average year, 1891–1902.*

Month.	San Francisco.	San Diego.	Galveston.	Savannah.	New York.	New Haven.	Boston.	Eastport.	Marquette.	Chicago.	Cleveland.	Toronto.
	°	°	°	°	°	°	°	°	°	°	°	°
January	w. 20 s.	w. 19 n.	s. 24 e.	s. 16 e.	s. 14 e.	s. 28 w.	e. 24 n.	s. 36 w.	n. 23 e.	e. 3 s.	n. 17 w.	s. 9 w.
February	w. 18 s.	w. 13 n.	s. 34 e.	s. 18 e.	s. 20 e.	s. 24 w.	e. 27 n.	s. 32 w.	n. 31 e.	e. 3 n.	n. 12 w.	s. 2 w.
March	w. 17 s.	w. 8 n.	s. 28 e.	s. 16 e.	s. 23 e.	s. 13 w.	e. 21 n.	s. 31 w.	n. 29 e.	e. 9 n.	n. 4 w.	s. 30 e.
April	w. 20 s.	w. 8 n.	s. 31 e.	s. 15 e.	s. 25 e.	s. 4 w.	e. 23 n.	s. 26 w.	n. 29 e.	e. 14 n.	n. 1 w.	s. 38 e.
May	w. 21 s.	w. 3 s.	s. 24 e.	s. 16 e.	s. 24 e.	s. 7 w.	e. 20 n.	s. 20 w.	n. 27 e.	e. 17 n.	north.	s. 42 e.
June	w. 23 s.	w. 21 s.	s. 19 e.	s. 18 e.	s. 21 e.	s. 12 w.	e. 18 n.	s. 26 w.	n. 27 e.	e. 12 n.	n. 2 e.	s. 27 e.
July	w. 27 s.	w. 1 n.	s. 6 e.	s. 16 e.	s. 16 e.	s. 19 w.	e. 15 n.	s. 22 w.	n. 30 e.	e. 12 n.	n. 4 e.	s. 17 e.
August	w. 27 s.	w. 4 n.	s. 5 e.	s. 16 e.	s. 18 e	s. 12 w.	e. 14 n.	s. 22 w.	n. 28 e.	e. 12 n.	n. 2 e.	s. 24 e.
September	w. 22 s.	w. 15 n.	s. 44 e.	s. 27 e.	s. 18 s.	s. 19 w.	e. 19 n.	s. 27 w.	n. 30 e.	e. 4 n.	north.	s. 25 e.
October	w. 19 s.	w. 16 n.	s. 45 e.	s. 25 e.	s. 18 e.	s. 19 w.	e. 27 n.	s. 29 w.	n. 25 e.	e. 3 n.	n. 7 w.	s. 31 e.
November	w. 17 s.	w. 29 n.	s. 35 e.	s. 22 e.	s. 19 e.	s. 23 w.	e. 27 n.	s. 32 w.	n. 26 e.	e. 8 n.	n. 19 w.	s. 16 e.
December	w. 19 s.	w. 24 n.	s. 29 e.	s. 19 e.	s. 13 e.	s. 31 w.	e. 24 n.	s. 35 w.	n. 29 e.	e. 2 n.	n. 12 w.	s. 12 w.

HEIGHT OF THE ATMOSPHERE DETERMINED FROM THE TIME OF DISAPPEARANCE OF BLUE COLOR OF THE SKY AFTER SUNSET.

By T. J. J. SEE. [Reprinted from Nature, October 1, 1903, p. 526.]

The extreme height of our atmosphere has been determined heretofore from the observation of meteors, which begin to glow when the friction becomes sufficiently intense to vaporize the materials of which they are composed. This method is very satisfactory from most points of view, and will perhaps continue to be used by astronomers. Nevertheless, I think it worth while to direct attention to another method, which is more simple, and which, I believe, will be found equally accurate. It consists in observing with the naked eye the gradual disappearance of the *blue* color of the sky as darkness comes on. It is surprising how accurate a person of good sight can make this observation when the atmosphere is perfectly clear. The time of sunset should be noted, and the time of the last sensible blue of the sky. With the data in the Nautical Almanac a simple computation by spherical trigonometry gives the depression of the sun at the instant the blue fades out into black, and we at once calculate the height of the illuminated particles overhead. The following are the results of some observations taken by the writer at Annapolis, Md.:

1903.	Height.	Remarks.
August 10	125 miles	A trace of blue remaining.
August 21	130 miles	Blue just vanishing.
August 22	133 miles	Sky just black.
August 23	135 miles	Blue has disappeared.
August 24	132 miles	Blue vanishing.
	Average 131 miles.	

The uncertainty of this value will probably be between five and ten miles.

The instant the blue disappears from the sky is a little indefinite, owing to the gradual thinning out of particles in the upper air sufficiently dense to reflect blue light which can be seen by the eye against a black night sky, but I have not found this indefiniteness so great as might be expected. It does not seem to lead to greater uncertainty in the height of the atmosphere than the method depending on meteors. * * *

According to Lord Rayleigh's theory the blue color of the sky is due to reflection of sunlight from minute particles of oxygen and nitrogen in the upper layers of our atmosphere. This theory receives its most striking confirmation from the long duration of the blue color after sunset, showing the great height of the particles which scatter the blue light. There can, I think, be very little doubt that our atmosphere extends to a height of about 130 miles.

The editor is pleased to be able to add that Professor See promises to communicate to the readers of the REVIEW, in the early future, the observations and the formulae on which the preceding article is based, so that other observers may be induced to make similar observations. From many observations, made in very different portions of the earth, a general result may be obtained that will be of considerable importance to meteorology.—*C. A.*

PILOT BALLOONS AND THE UPPER WINDS.

By F. O. HILLS. Dated Torrington, Conn., September 22, 1906.

At a church festival held September 21 in this place, a paper balloon was sent up [at about 8 p. m.]. It rose apparently to the height of a mile, going straight up, veering a very little toward the south. When it had reached its highest point, or nearly so, it started to move directly westward, and in a few minutes was out of sight. There was not a cloud in sight, and the sky remained cloudless until 10 p. m. But early next morning (September 22) the wind was blowing strong from the east, and by 8 a. m. it was raining quite hard. Evidently that balloon was in the path of this storm, altho there was no sign of a storm when it was sent up.

By reference to the morning map of Friday, September 21, it is seen that at that time westerly winds prevailed over Connecticut, as a part of the circulation around a low that was central east of Cape Cod. During the rest of that day, while this low disappeared, another one developed over the Lake region, so that on the morning of Saturday, the 22d, southeast winds prevailed along the coast from New Jersey to Maine. Of course in the interval between these two maps, during the shift of the winds from northwest to southeast, there must have been a period of calm, during which the balloon happened to be sent up. We doubt whether it could have gone as high as one mile, but it is certainly interesting to find that the easterly wind had begun at some high altitude, and that the influence of the low in the Lake region was felt high above us before it was felt at the surface of the ground. Of course observations of the motions of clouds would tell us something of the motions of the upper air; but clouds form principally in ascending air, and a cloudless blue sky is an almost infallible indication of the general presence of descending air. We may, therefore, conclude that, in the present case, a slowly descending easterly wind prevailed high above the calm air of Torrington during the evening of September 21; of course by the time that this air had attained the cloudy area around the low pressure it had become an ascending wind, and was itself cloudy and rainy. Inasmuch as manned balloons and sounding balloons can only rarely be sent up, while the small hot-air and the toy balloons are very common, it would be well for observers to record every case that comes to their attention similar to this observation at Torrington. Of course it is known that, as a general rule, when the sun warms up the lower air in the morning and it ascends, the upper air descends, bringing with it the wind of the upper regions; so that all day long the wind at the earth's surface has a close connection with that prevailing thruout the whole region thru which the vertical exchange takes place; but when the lower winds cease at nighttime, and no vertical exchange takes place, then the upper winds are quite unknown to us, except by the observation of balloons and clouds. In general, whenever calm prevails near the ground it is particularly desirable to know the drift of the upper air, as shown by the balloon.—EDITOR.

PROFESSOR ADOLF ERMAN.[1]

By WILHELM ERMAN.

[Translated from Berliner National-Zeitung, July 14, 1877.]

Prof. Adolf Erman was called away on the 12th of this

[1] In the Astronomische Nachrichten for 1868, pp. 369–378, there was published a mathematical paper by Prof. Adolf Erman, on the general circulation of the atmosphere, that is but little known to modern meteorologists. Its train of thought is so exactly parallel to that of the papers published by Ferrel in 1858–60 that I have always supposed it to have been suggested by reading either the original memoir of Ferrel or possibly some short abstract. Erman has been most widely known for his work in terrestrial magnetism, but he was first known in early life by reason of his exploration of the meteorological and magnetic phenomena in Russia and Siberia. This mathematical paper of 1868 reveals him, however, as an expert mathematician, applying his knowledge to the most difficult problem of meteorology. In order that we may do justice to the history of the development of meteorology, we take pleasure in preserving the memory of one about whose personal life but little seems to be known by publishing a translation of a biographical note, written by his son Wilhelm, which appeared in the Berlin National Zeitung on the 14th of July, 1877. Dr. Wilhelm Erman is now Director of the Royal and University Library at Breslau. He states that his father lectured on the subject of the earth's atmosphere in his university lectures at Berlin, from the year 1832 onward. Possibly the article in the Astronomische Nachrichten was included among these lectures, and we hope at some time to publish it in full in a second volume of translations bearing on the mechanics of the earth's atmosphere.—*C. A.*

month (July, 1877). His decease will not be without interest to the members of those circles which knew him while yet in his full vigor as student and citizen. Erman sprang from a Swiss-German family, resident successively in Schaffhausen, Mülhausen (Elsass), and Geneva. During the brief period when the family resided in the latter place one branch exchanged its original name of Ermanndinger for the corresponding Gallic form of Erman. Thus it came about that after the Ermans removal to Berlin during the past century the family identified itself with the French colony of this city.

Erman's grandfather, Jean Pierre, was the first of the family to receive an academic education. Until his death at an advanced age, in 1814, he led a life marked by success in many lines of activity, being a popular preacher, the director of the French gymnasium, which he brought to a new degree of success, a member of the academy, and state historiographer to Prussia.

His son Paul Erman (1764–1851) was also originally destined for the pulpit, but in his riper years transferred his attention to the natural sciences, in obedience to his own strong personal inclination. Altho Paul never attended a university, yet he was so successful both as investigator and as teacher at the war college, that upon the occasion of the founding of the University of Berlin, in 1809, he was tendered the regular chair in physics there. Almost up to the day of his death, at the age of 86, he was among the most inspiring of the teachers at the new university. He was elected a member of the academy in 1806, and was its secretary for over thirty years. Paul Erman made for himself a permanent place in the history of his chosen science thru his many valuable contributions to its advancement as well as by his zealous warfare against the errors of the School of Natural Philosophers, altho it was not, as he exprest it, given to him to draw any of the great prizes in physics which fell to the lot of some of his more favored contemporaries.

Adolf, the only son of Paul Erman, was born the 12th of May, 1806; was educated according to the family traditions, attending first the University of Berlin and later Königsberg. The young man received a careful training, especially at the latter university, where he studied under his future father-in-law, Bessel, thus acquiring those powers by means of which he was able to reach out into every branch of natural science during his long, active life, materially aiding in the advancement of each of them.

When scarcely 22 years of age his preparation enabled him to successfully undertake a journey around the world for the purpose of securing reliable data for studying the phenomena of terrestrial magnetism. The careful observations made by him during the three years of this journey form the foundations of the classic theory formulated by Gauss and Weber. With undiminished zeal Erman continued his work along this line during his lifetime, altho busied with numberless other problems as well. His last great work, "Foundations of Gauss' Theory and Phenomena of Terrestrial Magnetism in 1829," undertaken in 1874 at the command of the Imperial Admiralty, and carried out in cooperation with his student, H. Petersen of Kiel, was devoted to this subject. So far as his ill health permitted, similar works occupied all the last years of his life, and their continuation is now wholly in the hands of his faithful colaborer, Petersen.

Space does not permit us here to consider in detail the great activity of his life, especially since he was occupied with problems in nearly every field of science. The many-sided character of his works, too scattered as they are according to modern ideals, is to be explained by the manifold inspirations offered his receptive nature by his trip around the world, and by the many still incomplete publications on the extraordinarily rich collections he made during those years. One should remember also that a portion of that journey lay thru regions in northern Asia which had never before been visited by a scientific explorer, and that his return trip on the Russian corvette *Krotkoi* brought him to Sitka, California, Tahiti, and Rio at a period when even the last-named place lay infinitely farther from the usual routes of travel than it does to-day (1877).

If it be true that this many-sidedness, which enabled him to write works in astronomy, geology, and chemistry worthy of a specialist, also hindered him from producing an epoch-making work in his chosen specialty, yet the same characteristics preserved in him for many years a freshness and a receptivity of spirit which most specialists lose early, and won for him even during his lifetime high and deserved praise from nonprejudiced persons. Thus when, in 1840, Erman received the highest distinction in the gift of the Royal Geographical Society of London, its president, Sir Roderick Murchison, who was certainly a born critic, did not hesitate to acknowledge him to be, next after Humboldt, the greatest living geographical explorer.

There may be a double reason why Erman never received, even in his native country, that recognition which was undoubtedly due to his abilities. In the first place his activity as a teacher in the University of Berlin, where he was privatdocent from 1832, and extraordinary professor from 1834, never reached a large circle of students. This arose from a cause that surely does him no discredit. Erman scorned to present in his lectures the hundred-times repeated wisdom of the text-book, even in a modified form. He frequently exprest the opinion that such knowledge were much better obtained from some good text-book than thru university lectures. His lectures presented the results of his own explorations and original studies, at the same time assuming his hearers to possess already such training and experience as are not usual among students. Naturally the usual attendance at his lectures was very small, yet the few who followed him received thru him rich inspiration, and were sure of his personal help in every way.

The second ground for his nonrecognition is one which should not have any influence under normal political conditions, but which often wielded a decided influence even in the Fatherland during epochs which are, fortunately, now behind us. Contrary to the traditions of his family, Erman had already cast his lot with the Opposition in the early forties. With the growth of his conviction that there was no hope for any *bona fide* concessions to the wishes of the German Constitutionalists, at least on the part of the Government of Friederich Wilhelm IV, he became more and more outspoken in his adherence to a purely democratic and republican form of government. However idealistic may have been the reasons which drove him to this view, yet considering the bitter political strife which has arisen since 1848, one can scarcely blame his victorious opponents if their retaliation pursued the zealous and thoroly unselfish, tho perhaps indiscreet, man into a field that should be entirely divorced from politics.

The glorious success of the Prussian–German policy of the decade 1867–1877, and the but recently revealed aims of the present ruler and his great statesmen have exerted a mollifying influence upon the views of Erman and of many of his cothinkers. When he was in a small circle of trusted friends he did not hesitate to express his delight at the reconstructions effected in late years; but he could with difficulty bring himself to confess the same to his old opponents. Even the slightest suspicion of weakness in character was so distasteful to him that since 1866 he had preferred to withdraw entirely from the public life which up to that time he had followed with so much zest and had even borne some part in. In earlier years especially he never refused his aid wherever there was a serious endeavor to raise the standard of the pub-

lic intelligence, as e. g., thru the courses for workingmen; but here also he insisted upon thoroness and genuineness on the part of the teachers. No one thing was more odious in his eyes than that popularization of science which is based upon mere appearance of scholarship.

The severe illness which first attacked him in 1867 was an important factor in determining the decrease of his activities during recent years. With a slow but not uncertain step it brought about the dissolution of the once tireless mind and body which in earlier years had delighted in activity. Early on the morning of July 12, 1877 a gentle and painless death freed this able man from his sufferings, and bore him from the midst of his large circle of friends, admirers, and relatives.

EXPLANATION OF THE TABLE OF EXCESSIVE PRECIPITATION.

The REVIEW publishes each month, in Table IV, a statement of the accumulated precipitation during storms of certain intensities. The actual fall during periods of five minutes, ten minutes, etc., is given, in the right hand columns of this table, for each five minute interval up to 50 minutes, inclusive. When the excessive rate is continuous for more than 50 minutes the accumulated precipitation for such longer periods is printed in the following line or lines, and the actual duration of the given amount is found by adding to the figures printed at the top of the column an additional 50 minutes for each additional line employed. The times of beginning and ending given in columns 5 and 6 of this table will show, in such cases, that the total period is a continuous period and that the depths given are the accumulated depths from the beginning of the excessive rate of fall. In the REVIEW for December, 1905, for example, on page 566, the excessive rate at Atlanta on the 2d was continuous from 6:46 p. m. to 9:13 p. m., and the depth of 1.35 inch given in the 5-minute column is not for 5 minutes, but for 55 minutes, and the depth of 2.20 in the 20-minute column of the line below is for the total period of 120 minutes. The case is similar for Jupiter on the same page. The storm of the 2d at New Orleans, La., is recorded on two horizontal lines, but the times are not continuous, and the amounts given on the second line correspond to the times printed at the top of the columns.

The above explanation is prompted by the fact that some confusion has resulted from a too literal interpretation of the explanatory heading of these right-hand columns.—*F. O. S.*

THE ATMOSPHERE AND THE SOIL.

The Department of Agriculture, thru its various bureaus, seeks to investigate every condition that can in any way affect the growth of the plant and the character, quality, or quantity of the resultant crop. We quote the following paragraphs from an address by Milton Whitney, Chief of the Bureau of Soils, published as Farmers' Bulletin No. 257, on "Soil Fertility". The greater part of the paper is given up to the question of manures and fertilizers, but the following paragraphs relate to atmospheric influences.

Plants must breathe.

Of course we all understand that the breathing of the plant is mainly thru its leaves; but the soil also may be a very important factor in the breathing of plants, as it is necessary to have a supply of oxygen around the roots. Physiologists differ as to the office the roots have in regard to the absorption of oxygen. Whether it is a true breathing—the taking of oxygen for the plant economy thru the roots as thru the leaves—has never been decided; but it is unquestionably a fact that roots of cultivated plants require oxygen around them for their healthy growth. We know perfectly well that cultivation of the soil is important or necessary for the best development of many crops, and we say that this is in order to introduce oxygen and make possible the introduction of more water into the soil.

The investigations of the Bureau of Soils seem to indicate that the actual supply of oxygen to the roots may not be the only or even the most important function of cultivation. It seems necessary not only to introduce air into the soil, but, by stirring the soil, to permit the escape of noxious gases that are perhaps given off by the plants themselves, or produced by bacterial action on the remains or excreta of plants. In a crowded room a person begins to feel drowsy, languid, and his head begins to ache. We speak of these sensations, usually, as due to deficient ventilation, too little oxygen, the oxygen having been partly used up, and to an accumulation of carbonic-acid gas; but physiologists now believe that this is not the true explanation, but that the person suffers because there are gaseous emanations from the lungs that are deleterious to human beings. The plant is exceedingly sensitive to gases. On the streets of Washington one of the principal causes of the death of trees is leaks in gas pipes; every year hundreds and perhaps thousands of trees have to be removed, and the usual cause is a leaking gas pipe. The amount of gas is so small that it can not be detected by the odor, but the influence of the gas on the roots is so pronounced that the tree suffers and is likely to die. It seems probable that the ventilation of the soil is necessary not only to allow air to enter, but to allow gases formed in the soil to escape.

Furthermore, air must enter not only for the use of the root itself, but also to oxidize the organic matters given off by the plants—to preserve the proper sanitary conditions in the soil—as I shall explain later. Ventilation to remove noxious gases might increase the yield without affecting the fertility. Ventilation for the purpose of oxidizing organic matter might affect fertility itself.

THE CLASSIFICATION OF CLIMATES.

We call the attention of our readers to a most instructive series of articles by Prof. R. DeC. Ward, on "The classification of climates", published in the Bulletin of the American Geographical Society, for July and August, 1906. After explaining in detail the many classifications that have been suggested by various students, Professor Ward concludes as follows:

The broad classification of climates into the three general groups of marine, continental, and mountain, with the subordinate divisions of desert, littoral, and monsoon, is convenient for purposes of summarizing the interaction of the climatic elements under the controls of land, water, and altitude. But in any detailed study some scheme of classification is needed in which similar climates in different parts of the world are grouped together, and in which their geographic distribution receives particular consideration. It is obvious from the preceding paragraphs that an almost infinite number of classifications might be proposed; for we may take as the basis of subdivision either the special conditions of one climatic element, as, for example, the same mean annual temperature, or mean annual range of temperature, or the same rainfall, or rainy seasons, or humidity, and so on; or, again, similar conditions of the combination of two or more elements of climate may be made the basis of classification; or we may take a botanical or a zoological basis. Of the classifications which have been proposed, special reference is here made to those of Supan, Köppen, and Hult. That of Supan, taken as a whole, gives a rational, simple, and satisfactory scheme of grouping, whose frequent use in climatic descriptions would tend toward system, simplicity, and facility of comparison. It emphasizes the essentials of each climate, and serves to impress these essentials upon the mind by means of the compact, well-considered verbal summary which is given in the case of each province described. Obviously, no classification of climates which is at all complete can approach the simplicity of the ordinary classification of the zones.

Köppen's admirable scheme of subdividing climates from the botanical point of view is distinctly rather for the use of students of plant geography than of general climatology. The present limits of the different climates in Köppen's map will doubtless need to be changed in several cases, as more detailed botanical studies throw further light on the geographical distribution of different plants, and no rigid delimitation of plant zones is ever satisfactory to everyone. But Köppen's classification has the great merit of recognizing the existing differences of climate between east and west coasts, and between coasts and interiors. The coordination of districts of vegetation and of climate, which this scheme so strikingly emphasizes, is a noteworthy fact in climatology.

Hult's classification is far too detailed, if all the smaller provinces are taken into account; but if only the larger kingdoms are considered, as in Plate II [not reproduced], the scheme is useful. It, however, possesses no advantages over that of Supan, which takes account of more typical characteristics of climate. Ravenstein's hygrothermal types rest upon unsatisfactory data, and regions of very different climatic conditions are grouped together because they happen to have the same mean annual temperature and relative humidity.

THE WEST INDIAN HURRICANES OF SEPTEMBER, 1906.

By E. B. GARRIOTT, Professor of Meteorology.

Tropical storm development was exceptionally active in American waters during September, 1906. In seeking the causes of

this activity we find an apparent contributory condition in the distribution of atmospheric pressure over the region of observation. In the West Indies and adjacent waters barometric pressure was unusually low, while in the more northern latitudes of the Atlantic, and more especially from the Azores over the British Isles, the barometer averaged above normal, and after the 17th was remarkably high. This arrangement of air pressure overlying the Atlantic naturally produced an unusually strong flow of air from the more northern latitudes toward the Tropics, and in this accelerated movement of air currents is found a recognized associated cause of tropical storm development. In fact a distortion or reversal of the usual order of barometric distribution invariably produces weather of abnormal types over considerable areas. A notable instance of this kind was presented during the winter of 1904–5 when general and excessive rains occurred thruout New Mexico, Arizona, and southern California. As stated by the Chief of the Weather Bureau at the time[1] the cause of the heavy rains in the southwest was not local, but was associated with general abnormal atmospheric conditions over the United States that were in turn associated with abnormal conditions that obtained over a large part of the Northern Hemisphere. He stated that the association between low barometric pressure and excessive rains in the southwest and high barometric pressure and unusual cold in the north and east had been established, and that during winters of excessive cold in northern and eastern districts of the United States the winters had been unusually wet from western Texas to southern California. During September, 1906, the stormy weather in the West Indian region attended a distribution of barometric pressure over the Atlantic Ocean similar to that observed over the North American Continent during the winter storm period of 1904–5 in the southwestern portion of the United States. Numerous examples of this observed association of apparent barometric causes with weather effects can be cited. Those referred to, however, will answer the present purpose of inviting attention to an arrangement of atmospheric pressure that figures prominently during certain phases of abnormal American weather.

Chart IX shows the paths of the three hurricanes of September, 1906, here discust, over the West Indies and adjacent waters.

THE WEST INDIAN STORM OF AUGUST 31–SEPTEMBER 15, 1906.

The approximate path of the center of this storm has been traced from a position east of Barbados, W. I., on August 31, to the region north of the British Isles, on September 15. Seven days were occupied by the storm in advancing from the ocean east of Barbados northwestward to the northern Bahamas, and two days, the 6th and 7th, in making a recurve over the Bahamas. Moving thence northeastward the center past west and north of Bermuda by the morning of the 9th and reached the region of the Banks of Newfoundland by the 10th. The subsequent path of the storm was north of the region from which observations have been received. As the barometer over the British Isles began to fall on the 11th and continued to fall rapidly until the 15th, when the center of a well-marked and energetic depression past north of Scotland on an easterly course, it may be assumed that this disturbance was identical with the one that moved north of east from the Banks of Newfoundland during the 11th.

During September 1 and 2 the vortex of the storm pursued a course over the ocean east of and near the Lesser Antilles, and by the morning of the 3d had past north of Porto Rico. No reports have been received from vessels that encountered the storm on these dates. The following, from islands of the Leeward group, indicate measures of protection that were taken on advices telegraphed from Washington.

[1] Monthly Weather Review for April, 1905, Vol. XXXIII, p. 152.

Mr. D. Hope Ross, official in charge of the Weather Bureau office at Basseterre, St. Kitts, W. I., reports:

The morning of the 1st the barometer, which had been steadily falling since 9:30 the previous night, read 29.76 at 6 a. m. It rose slightly, to 29.77 at time of observation, and then fell steadily until 5 p. m. to 29.64, the lowest point reached, after which it rose slowly. The wind steadily decreased from midnight of August 31, and at 12:30 p. m. of September 1 the velocity was less than 3 miles an hour. Shortly after it increased slowly, shifted from north-northeast and north to southwest and south-southwest. It blew steadily from that quarter with increasing force, and reached a maximum velocity of 60 miles at 3:35 to 3:40 a. m., of the 2d, with an extreme velocity for one minute of 70 miles per hour at 3:36 a. m. Rainfalls were heavy, and varied from about 6 to 13 inches at different points on the island. The telegram of advice received the morning of the 1st was issued as a precautionary warning. This was done especially by telephone, to Government offices and other centers in town, and to outlying districts, and all possible information was given to callers at the office. Comparatively little damage was done by the storm. Owing to the prostration of telephone lines communication to outlying points on the island was temporarily cut off; many trees were uprooted, and a few small houses were blown down; but everyone being prepared there appears to have been no further damage.

The following letter, dated September 4, from Mr. Christopher H. Payne, American Consul at St. Thomas, W. I., indicates the character of the disturbance during its passage over the region of the Virgin Islands:

Your cablegram of September 1, 1906, received, for which I beg of you to accept my sincere thanks; also the business people of this place, as your timely warning has saved millions to shipping in this harbor. I sincerely hope that you will find it a pleasure in advising me of all future disturbances during this dreaded season. I beg to assure you this office is at your command at all times in whatever way we can serve you in your great work.

The Weather Bureau observer at San Juan, P. R., reports:

The storm apparently followed the course forecast in the message received September 1. All vessels were advised to remain in port; the advices were heeded and no material damage has been reported. Vieques is the reporting station nearest to the path of the storm; no material damage was caused on that island altho 8.48 inches of rain fell on the 4th. The maximum wind velocity at San Juan was 35 miles an hour from the west on the 3d.

During the 4th and 5th the center of disturbance moved northwestward toward the northern Bahamas, passing north of Turks Island on the 4th. During the 6th and 7th it gradually recurved east of the northern Bahamas and was severely felt by vessels navigating that region. At 3 a. m., September 7, the three-masted schooner *John Rose*, John Douglas, master, in latitude north 28° 37′, longitude west 77° 4′, had a barometer reading of 29.01. This vessel was coal-laden for Key West, and was held before the wind on a southwest course and crost the path of the storm ahead of the center. The shift of the wind encountered was from northeast back to north and northwest, but there were no cross seas until after the center had past. By the morning of the 8th the storm had completed its recurve to the northeastward. On the morning of that day Bermuda, and Lloyds, London, were cabled that a tropical disturbance was approaching Bermuda from the southwest. By the morning of the 9th the center had past west and north of Bermuda and the reading of the barometer at Hamilton was 29.18 inches. The storm was exceptionally severe in the trans-Atlantic steamer tracks on the 10th and 11th. The experience of the North German Lloyd steamship *Koenigin Luise* indicates the intensity of the storm in the region of the Grand Banks. This steamship encountered the hurricane Septemer 10 in latitude north 39°, longitude west 55°, and at 8 p. m. the barometer read 28.06 inches. The vessel was unable to resume full speed until 5 a. m. of the 11th, fourteen hours after the storm began. The subsequent course and character of this storm will doubtless be determined by vessel reports that are not now available.

THE ATLANTIC COAST STORM OF SEPTEMBER 17.

Unsettled weather conditions over the West Indies followed the passage of the storm of August 31–September 11 over the

Western Atlantic, and on the 12th there was evidence of a slight depression near Porto Rico. From this position it moved to the neighborhood of the Windward Channel by the 13th, where there were indications of its presence on the 14th, after which it appeared to pass northward over the ocean. During the 16th falling barometer and increasing northerly winds along the south Atlantic coast showed the presence of a barometric disturbance off that coast, but an absence of reports from the great ocean area rendered it impossible to locate the center of the disturbance or to determine its future course. On the morning of the 17th its close approach to the Carolina coast was shown, and by 1 p. m. it had reached the coast line north of Charleston, where the barometer at that hour read 29.44 inches and the wind had reached a velocity of 46 miles an hour from the west. At Wilmington the maximum velocity had been 52 miles an hour from the northeast. After crossing the coast line the storm lost strength rapidly, and during its subsequent course to the lower Ohio Valley and thence northeastward its energy was expended in heavy rains. Damage on land by wind was of a minor character, and no serious injury to property has been reported. The damage to shipping along the coast between Charleston and Wilmington was, however, considerable, and crops were destroyed near Georgetown where the storm moved inland. West Indian stations in the indicated line of its advance were notified on the 12th and 13th of the character of the slight barometric depression from which this storm sprang. During the succeeding two days its presence off our southern coasts was but faintly indicated by land observations. On the 15th advices were issued that there was evidence of a disturbance between the Carolina coast and Bermuda that was apparently moving northward. The storm that struck the South Carolina coast was a small tornado-like development in the southern end, or tail, of the disturbance referred to, and its origin and course was a product of oceanic atmospheric conditions that were not shown by land observations.

The observer of the Weather Bureau at Charleston, S. C., reports as follows regarding this storm:

On the day preceding the storm no unusual phenomena were observed at this station. The barometer began to fall at 11 p. m., of the 16th, and fell steadily until it reached a minimum of 29.44 inches at 1 p. m. of the 17th, after which it rose rapidly. Light to moderate northerly winds continued during the 16th, shifted to northwest at 5 a. m., 17th, and backed to south at 5 p. m., from which quarter it continued until midnight. From 11 a. m. to 9 p. m. it blew a moderate and at times a fresh gale, the highest velocity, 48 miles an hour, occurring at 3:30 p. m. By midnight it had diminished to 22 miles an hour.

The damage to buildings in Charleston was small, not exceeding $1000, and was confined principally to small buildings. At Georgetown, S. C., a small town 60 miles northeast from Charleston, the damage was estimated at $15,000. The winds being offshore during the storm, the storm tide did not exceed the normal high tide more than one and a half feet, and consequently no damage resulted from high water in exposed portions of the city.

THE CARIBBEAN SEA STORM OF SEPTEMBER 23–27, 1906.

This was the severest disturbance that has visited the Gulf coast since the occurrence, on September 8, 1900, of the storm that devastated Galveston. That storm advanced from the eastern Caribbean Sea to the Texas coast during September 1 to 8, 1900. The September, 1906, storm was first definitely located over the western portion of the Caribbean Sea on the 22d and crossed the Gulf coast line west of Mobile the morning of the 27th. After leaving the Yucatan Channel, on the 24th, the storm moved almost due northward over the Gulf of Mexico. During this period there was an almost equal chance for the center to swing to the northeastward over the Florida Peninsula and thence along the Atlantic coast, or to the northwestward to the Texas coast. Daily advices and warnings based upon careful calculations announced, however, that its course would probably be northward toward the central Gulf coast, and beginning on the 23d Gulf shipping was advised to remain in port. When a storm of this type is hundreds of miles from reporting coast stations it is apparent that its intensity and exact course can not be accurately determined. The warnings issued during the four days of its progress over the Gulf were based upon an assumption that the disturbance possest in full degree the intensity that usually characterizes storms that advance from the Caribbean Sea over the Gulf of Mexico; and day by day the statement was clearly made that conditions dangerous to shipping would exist over the central and east Gulf. So far as known the warnings were heeded, and vessels did not venture into the threatened district. It is a fact, indeed, that of the millions of dollars of damage an infinitesimal portion was done to shipping in the open Gulf. The monetary value of vessels and cargoes thus protected, and the number of human lives safeguarded, can not now be calculated. Adequate protection could not have been made against damage and destruction by banked up water from the Gulf that swept over harbors, bays, inlets, and low-lying coasts, and from washouts due to torrential rains that attend storms of this character. The center of the storm crost the coast line near and west of Mobile at about 8 a. m., seventy-fifth meridian time, of the 27th. East of the point where the center crost the coast an onshore southerly gale combined with the wave from the Gulf to drag vessels from their anchorage, and caused water damage to shore property that was not experienced west of the storm's path, where northerly offshore winds prevailed during the period of the storm's greatest intensity. After the 27th the strength of the storm diminished rapidly, and during its subsequent course northward over the lower and middle Mississippi Valley heavy rains fell within its area.

The following are accounts by observers of the Weather Bureau and newspapers of storm action and losses at and near their respective cities:

Tampa, Fla.

The Weather Bureau followed the disturbance from its inception to its destructive violence at Mobile and Pensacola, and many congratulations have been received on its good work in keeping so closely in touch with the progress and development of the storm. The first information regarding the storm was received at 11:45 a. m., September 23, when the disturbance was near Grand Cayman and moving toward the Yucatan Channel. At this station the approach and passage of the storm over the Gulf was shown by violent squalls of wind, rapidly moving clouds, and abnormally high tides.—*Jno. S. Hazen, Local Forecaster.*

The Tampa Tribune, of September 30, 1906, comments editorially on the storm as follows:

The great storm in the Gulf has given an excellent demonstration of the effectiveness, accuracy, and practical utility of the Government weather forecasts. It was on last Sunday that the Weather Bureau office in Tampa flew its warnings of the approach of a great tropical storm which was then appearing in the region of the Yucatan Channel. From that time on the Bureau sent daily and urgent warnings of the progress of the disturbance. As the storm came within the area of a more intimate observation, its character, severity, and direction were more closely reported. The second day before it struck the coast, special warnings were sent to Gulf ports for the guidance of shipping, with the most urgent advice that vessels remain in port till after the disturbance. It is already known that many vessels heeded this warning and were without doubt saved because of it. * * * That the storm would strike the middle Gulf coast with great fury was the notification given two days before it struck. That the city of Pensacola was in especially grave danger, and would be near the center of the most severe disturbance, was announced twenty-four hours before the storm broke over that city.

New Orleans, La.

The severest storm that has visited the middle Gulf coast for several years prevailed from September 25 to 27. The work of the Weather Bureau in forecasting the progress, probable path, and intensity of this storm was exact in almost every particular. The system of distribution of storm-warning advices is so complete that not only did places having telegraph and telephone service receive the warnings, but thru the intelligent and prompt action of all employees and agents of the Bureau every fishing camp received timely warning. Acting on advices people in exposed localities sought places of safety, and vessels either remained in port or sought shelter in protected places along the rivers and bayous.

Every precaution was taken to reduce the damage from the approaching storm to a minimum. On the morning of the 27th there was about three feet of backwater in the river at New Orleans, indicating a storm tide at the mouth of the river of six feet or more. Such a high tide is exceedingly dangerous, and but for the timely precautions taken there would have doubtless been much loss of life and property. The highest wind velocity reached at New Orleans was 49 miles an hour from the northwest at 8 a. m. of the 27th, and the lowest barometer on record for the station during the summer months, 29.14 inches, was reached at 8:15 a. m. of the 27th (see fig. 1). The storm was severe east of New Orleans, but there does not appear to have been any loss of life on the Mississippi and Louisiana coasts. The damage to property that could not be moved or protected was great. At Burwood the tide was over the wharf, which is eight feet above mean Gulf level. Railroads and crops suffered great damage.

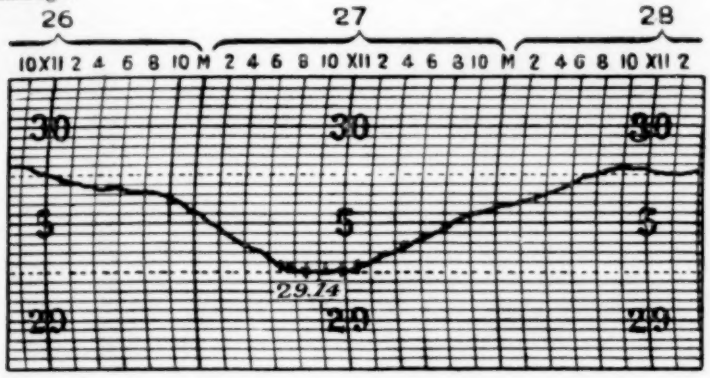

FIG. 1.—Barogram, New Orleans, La., September 26–28, 1906.

It is impossible to estimate the amount of damage that was caused by the storm in this section, but it amounts to several million dollars. Shipping remained in port and prepared for the storm, and there have been no great losses reported. The losses in this section were exceptionally small for such a storm, and this is attributed by the press and public to precautions taken on account of the timely warnings issued by the Weather Bureau, as indicated by the following extracts from editorials that appeared in the local press.

The Times-Democrat of September 28, 1906:

While only meager details of the damage wrought by the storm on the Gulf littoral are obtainable on account of injury to the telegraph service, the reports indicate severe losses of property at several points on the coast, much suffering and inconvenience in a number of communities, and possibly a loss of life. No doubt the losses would have been much greater but for the timely and accurate warning given by the United States Weather Bureau. Notice that the disturbance was approaching the coast, and that it was unusually severe in character, enabled shipping interests to avoid the dangers of the open sea, and very greatly minimized the damage incident to the violent visitation. Because of the high standard of efficiency reached by the Weather Bureau, and the extension of the service to West Indian points, we may now escape many disasters of the character hitherto experienced during these meteorological disturbances; indeed with reasonable care we should be able to reduce our losses on the coast, and in the Gulf, to the minimum.

The Daily Picayune of September 29, 1906:

When the full record of the damage from the recent storm will be made up it will be found that altho the property loss has been quite extensive the total loss of life has not been nearly so great as in many past storms of even less magnitude. This fact was probably due to the timely warning of the storm's approach, which enabled everybody likely to be especially exposed to take proper precautions.

Pensacola, Fla.

This was the most terrific storm in the history of Pensacola, or since the village of Pensacola, on Santa Rosa Island, was swept away 170 years ago. The greatest loss was to the shipping interests; a large number of ocean going vessels, tug boats, fishing smacks, launches, and craft of all kinds were wrecked upon the beach; the wreckage is strewn from Magnolia Bluff to the entrance of the harbor. During the early morning hours the people of the city were panic stricken, many believing that a repetition of the Galveston disaster was imminent, and large numbers of people took refuge in the higher portion of the city, braving the high winds and stinging sand-filled rain in the hope of reaching a place of safety. When the wind reached 60 miles per hour (at 1:07 a. m.), every effort was made to protect property and life and people were driven from their homes along the water front. Trees were uprooted; houses were unroofed, and vessels in the harbor began to drag their anchors, being slowly but surely forced upon the beach. At the height of the storm (between 3 and 4 a. m.) the water rose 8½ feet above the normal high-water mark, being the highest known. The great protection afforded by Santa Rosa Island saved Pensacola from more severe suffering. The entire water front property was inundated, the water reaching many houses; some were either carried away completely or irreparably damaged. Muscogee wharf was broken in two in the middle, and the tracks on either side of the main dock were washt away. Thirty-eight coal cars which were on the wharf were washt away. A timber boom was broken and the timber cast adrift; this timber and wreckage of every description is jammed upon the beach in a torn and twisted mass. The water backed up in the low ground north of Intendencia street, where several cottages were innundated, the water in places reaching a depth of 10 feet. About the greatest havoc was wrought along West Main street, the south side of which has been completely washt away. The houses along the bay shore from Barcelona street to Perdido are in ruins and all along the shore innumerable vessels are scattered. The damage to the fishing industry alone will probably aggregate half a million dollars and that to the tow boat industry will aggregate as much more. Several wharfs are completely gone. On Palafox street from the wharf north to Wright street there is hardly a building that has escaped damage, and in many instances the losses will be heavy, as the tin roofs were blown from many and the driving rain damaged stocks to a great extent. The train service in and out of the city is completely paralyzed. A train came in from the north this morning during the storm, arriving many hours late, the train men reporting that every few yards it was necessary to stop and remove trees and poles from the track. From Magnolia Bluff to Milton the track is gone and a portion of Escambia Bridge is washt away. A channel was washt thru Santa Rosa Island east of the Life Saving Station; the station itself is gone and the entire shore is a mass of ruins. Fort Barrancas is much damaged, Fort Pickens has suffered severely, and Fort McRae is completely razed, the ruins of the old fort standing alone on the shore. [Figs. 2, 3, and 4 show some effects of the storm, and fig. 5 reproduces the barograph trace at Pensacola.]

There were only two of the local steamers in operation on the morning of the 28th, namely, the U. S. S. *Poe*, of the Quartermasters Department, net tonnage 106, and the dredge *Caucus*, of the Engineer Department, net tonnage about 1000; these vessels, together with the *Pilot*, belonging to the Pilot Association, net tonnage 66, and a few fishing smacks, took up anchorage behind High Bluff on the peninsula between Town Point and Deer Point, which sheltered them from the full force of the easterly gale, and they were protected from the Gulf by Santa Rosa Island. An idea of the force of the storm in that locality and westward from the navy-yard may be gained from the following facts. The *Pilot* and the *Caucus* were equipped with extra good ground tackle, but the *Poe* had only common large anchors. The *Pilot* let down one anchor at 1 a. m. in 16 feet of water with 75 fathoms of chain out, and another anchor with 45 fathoms of chain out at 2 a. m.; she took up anchors in 20 feet of water, having drifted about 150 yards; her engines were not working. The *Caucus* had two anchors out and half steam ahead, and with her bins half full of water, only drifted 100 yards. The *Poe* with full steam ahead dragged her two anchors three and one-half miles to the navy-yard where they caught in moorings used for coal barges, and this saved her from going ashore.

Wharfmaster Cox stated that the tide was fully ten feet above normal high tide along the city water front and twelve feet at Bayou Grande, based upon the reckonings of five reliable men. The sea swells entering the slip between Palafox and Baylen streets were from seven to twelve feet high between midnight and 7 a. m. and were about one hundred yards apart, lifting wharf timbers and boards as they rolled thru the slip and splashed over Cedar street. Oyster boats, launches, steam tugs, lighters, timbers and wreckage of all description are jammed together at the corner of Cedar and Baylen streets; the launch Wolverine, a boat 40 by 9 feet, past over Cedar street and entered the lot at the northeast corner of Baylen and Cedar streets, followed by other wreckage mentioned above. Trees fully exposed to the easterly gale in all parts of the city were blown down, the chinaberry and sycamores suffering most. All weak chimneys that were broadside to the east were tumbled to the westward. Whenever the wind got under a tin roof it rolled it off.

The foreign merchant vessels in port on the 26th were 5 steamships, 7 full-rigged ships, and 13 barks. One bark is a total wreck, and 11 other barks and ships are stranded; also an American schooner is sunk and over on her side. Before the hurricane there were in port 38 schooner-rigged fishing smacks; now 29 are ashore and 16 of these are probably total wrecks. Of 36 lumber barges only 8 remained afloat, and of 8 tugs 2 are afloat, 3 are totally wrecked and 3 can be floated.

The navy-yard was exposed to the full sweep of the easterly gale and all naval boats, except the *Isle De Luzon* and two water boats, are either sunk or ashore; this includes the wooden dry dock, and all coal barges except one; all tugs were sunk; the Spanish steel dry dock is apparently undamaged but aground; the entire water front at the yard is a mass of wreckage. Houses along the water front in Wolsey and Warrington are destroyed by either wind or water, and a great many are washt away.

The total known deaths are 32.

The estimated damage is as follows: to buildings in Pensacola by wind, $50,000; to interior finishings and stock by rain, $100,000; to buildings and wharfs, timber and lumber by tide from the sea, wind, and wave, $775,000; to shipping, $1,000,000; to telephone, telegraph,

FIG. 2.—The effect of the storm at Pensacola, Fla.; view looking northeastward along Baylen street, showing the jam of craft of every description, timber, and lumber.

electric light, and trolley wires, $20,000; to foliage of the city, including cost of clearing streets, $50,000; to railroads by tides from the sea and washouts by heavy rains, $125,000; total estimated damage in Pensacola, immediate anchorage, and water front as stated above, $2,120,000. In addition to the above we have an item that can hardly be estimated; that is, the washing away of lots along the water front caused by the water rushing out to seek its level in the Gulf after the storm had past from the water to the land surface; in many places there were embankments eight feet high where now there is a depth of water measuring five feet.

In the vicinity of Pensacola the damage is estimated to be: to navy-yard, forts, etc., $1,100,000; by tides along the shores of East Bay, Escambia Bay, etc., $125,000; by tides in St. Andrew Bay, "12 inches above anything in past nineteen years", $5000; by tides and wind at Apalachicola, Fla., $12,000; by winds and rain at Goulding, Fla., $13,000; to timber and turpentine interests in Escambia and Santa Rosa counties, $40,000.

The estimated damage by wind and wave, and height of tides at Pensacola during the severe storms of the past twenty-seven years, is as follows:

Date.	Damage.	Tide above normal.
		Feet.
October 2, 1893	$1,100	.....
October 8, 1894	.....	4.5
July 7, 1896	400,000	5.0
August 15, 1901	112,000	.....
February 27, 1902	1,100	.....
September 26–27, 1906	2,120,000	10.0

The following tidal heights from Pensacola eastward will give an idea of the wave that attended the storm of September 26–27, 1906: Pensacola Bay, 10 feet; East Bay, 9 feet; St. Andrew Bay, 6 feet; Apalachicola Bay, 5 feet.

During the past twenty-seven years there have been eighteen days on which the wind attained or exceeded a velocity of 50 miles an hour at Pensacola; of these the maximum velocities of 60 miles, or more, were the following: August 20, 1888, 60, sw.; October 2, 1893, 66, sw.; October 8, 1894, 68, ne.; July 7, 1896, 72, n.; August 15, 1901, 70, sw.; December 28, 1901, 60, sw.; September 27, 1906, 83, e.

The Pensacola Journal, September 30, 1906, remarked:

The efficiency of the service of the United States Weather Bureau in giving warning of approaching storms was never better demonstrated than during the recent hurricane, the first warning of which was received and sent out by the observer at Pensacola on September 22, four days before the gale became dangerous in this vicinity.

Mobile, Ala.

The storm of September 26–27 was more destructive than any other in the meteorological history of the station, involving a greater loss of property, more numerous marine disasters, and greater destruction to timber.

The storm approached this section without any optical premonitory signs or noticeable cloud formations. Cloudy weather with stratus clouds began on the morning of the 25th, and there was occasional sunshine until about noon of the 26th; and only light rain, at times a mere drizzle, was recorded during a part of this period. On the 26th the fall in

FIG. 3.—The effect of the storm at Pensacola, Fla.; view northward from Muscogee wharf, showing the effect of the high seas on the embankment.

FIG. 4.—The effect of the storm near Pensacola, Fla.; fishing smack driven ashore; damaged cement residence at Palmetto Beach; the waves broke in the second story windows and washt the foundations from under the veranda.

barometer pressure and the increase in wind velocity, which had been gradual, became more rapid toward night. The wind, which was remarkable for the severity and suddenness of its gusts, reached a maximum velocity of 25 miles an hour between 5 and 6 p. m. and higher velocities were attained during succeeding intervals until a maximum of 55 miles, from the east, for five minutes, was reached at 7:15 a. m. of the 27th, and a single mile was made in somewhat less than a minute; after which lower velocities were recorded and no high velocities occurred after 11 a. m. The direction of the wind varied from north to northeast till midnight of the 26–27th, then it was northeast till 6 a. m., then east prevailed with momentary gusts from the northeast and southeast till 8:05 a. m., and southeast afterwards with occasional gusts from the east.

The lowest reading of the barometer, 28.84 inches, was reached at 6:30 a. m. [See fig. 6.]

The rain, which was continuous from 12:05 p. m. of the 26th, at times became a heavy downpour. The amount which fell from 12:05 p. m. of the 26th to 7:20 p. m. of the 27th was 6.40 inches.

During the morning of the 26th, the tide reached within six inches of the top of the wharf; it then receded and was one or two feet below the level of the wharf till about 6 a. m. of the 27th; a rise then began and in about half an hour the water was near the top of the wharf; by 7:45 a. m. it had come into the third street from the river, and at 10 a. m. it attained its maximum stage, exceeding by about a foot the stage reached during the hurricane of 1893. During that memorable storm the water was about six feet above the wharf. In the hurricane of 1901 the tide did not reach so high a stage as in 1893. Markings at the Cotton Exchange Building indicate 13 inches higher water in 1906 then in 1893, and these differ but slightly from the average of measurements taken by Mr. Wright Smith. Mr. Smith's figures for the high water occasioned by the last three storms are as follows: 1893, 8.80 feet above mean tide; 1901, 8.25 feet; 1906, 9.87 feet.

The following is a list of storms with wind velocities of over fifty miles an hour which have occurred at Mobile since 1872:

August 20, 1888.—Maximum wind velocity 56 miles from the southeast; water 3 feet deep over wharfs; estimated damage, $10,000.

April 14, 1889.—Maximum wind velocity 60 miles from the southeast; estimated damage, $25,000.

October 2, 1893.—Maximum wind velocity 72 miles from the southeast; several vessels ashore; wholesale business district inundated, and stage of water said to be higher than at any time since 1852; seven lives lost in Mobile County; estimated damage by tides, $ 00,000; by winds, $50,000; storm more destructive on the Mississippi and Louisiana coasts.

August 15, 1901. Maximum wind velocity 60 miles from the southeast; a number of small vessels lost; wholesale business section inundated; no loss of life; estimated damage by tide, $75,000; by winds, $25,000.

September 26–27, 1906.—About twenty buildings, mostly houses in the residential section of Mobile, demolished. Nearly all buildings were more

or less damaged. Windows were blown in, chimneys felled, tin roofs rolled up, slates and shingles ript off so that few interiors of houses escaped damage by the rain. In some places heavy timbers were carried considerable distances. Many merchants in the wholesale district had elevated their wares, but the tide exceeded all previous stages and damaged the lowermost goods. All electric services were totally crippled, the telegraph wires being down by 3 a. m. of the 27th. The roads were made impassable by prostrated trees. There was only one life lost in Mobile. The wharfs were greatly damaged and shipping suffered considerably. The official list of American vessels wrecked, kept at the office of the collector of customs, is not yet completed. Unofficial records of all marine disasters show that in Mobile Bay and River there were 11 steamships, 17 barks and schooners, and 4 steamboats ashore or sunk, 12 tugboats sunk, ashore, or capsized, and numerous barges and smaller craft which met a similar fate. There are also 11 steamships, barks, and many smaller vessels dismantled or otherwise damaged. In Mobile the estimated damage to buildings and electric services by the wind is $500,000 and by the tide, $50,000. The damage to merchandise by the tide is $175,000, and by the rain and wind, $250,000. The damage to vessels owned in Mobile is $175,000. The damage to railroads entering Mobile is estimated at $500,000.

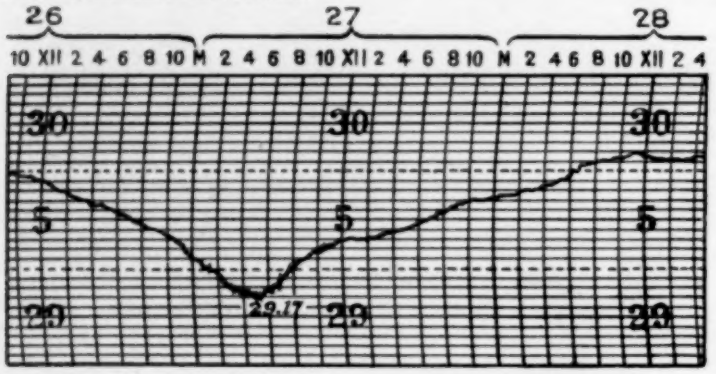

FIG. 5.—Barogram, Pensacola, Fla., September 26–28, 1906.

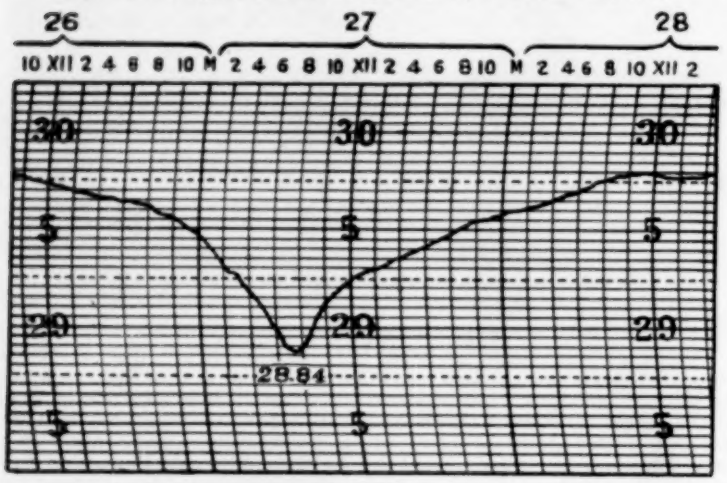

FIG. 6.—Barogram, Mobile, Ala., September 26–28, 1906.

The warnings of the Bureau prevented a greater loss of life, as nearly all vessels remained in the river. However, the storm was of so great severity that ships were torn from their moorings, collisions occurred, and the wind alone dismantled or damaged others. Till about 3 a. m. of the 27th, the office telephone was in almost continuous use; and as the barometer pressure continued to decrease, the information was given that the severity of the storm would increase. Shortly before 1 a. m., when the barometer pressure began to fall rapidly, the additional information was given that high tides were probable altho the northeast wind had prevented high water. The impracticability of securing labor during the already stormy conditions, the belief of many that only southeast winds can cause high tide, the absence of light in the early morning hours, and the subsequent rapid rise of the tide to a stage exceeding past records, greatly increased the amount of damage by water.

All localities in southern Alabama and southeastern Mississippi sustained great damage to property, but in the southern parts of Mobile and Baldwin counties the storm was most destructive to life and property and the damage will probably reach a million dollars. On the southern coast of Mobile County about one hundred persons lost their lives, mostly by drowning in the high tide which swept the coast.

Within a radius of 70 miles from Mobile about one half of all the timber boxed for turpentine production and from 5 to 35 per cent of all other timber has been blown down. It is not yet known how much may be utilized, and it is impracticable to approximate the loss as it is variously estimated from ten million to one hundred million dollars.

At Fort Morgan an anemometer, which owing to its worn condition registers velocities 5 per cent too low, was in temporary use during the storm. During the eight hours and forty-eight minutes ending at 2:45 a. m., at which time the aluminum anemometer cups were whirled off the steel arms, it recorded 590 miles. Several times after midnight a maximum velocity of 85 miles was recorded for a period of five minutes; 3 miles were recorded in two minutes, which is at the rate of 90 miles an hour; this, with a 5 per cent correction added, is more than 94 miles an hour.

Lieut. B. L. Brockway, of the U. S. Revenue steamer *Winona*, which was at Scranton, Miss., during the storm, sends the following memoranda, thru the observer at Mobile:

Date.	Hour.	Barometer reading.
		Inches.
September 25–26	midnight.	29.82
September 26	8:00 a. m.	29.80
Do	noon.	29.77
Do	8:00 p. m.	29.64
September 26–27	midnight.	29.45
September 27	4:00 a. m.	29.07
Do	4:30 a. m.	29.02
Do	5:00 a. m.	28.96
Do	5:10 a. m.	28.90
Do	5:30 a. m.	28.75
Do	6:00 a. m.	28.68
Do	6:30 a. m.	28.60
Do	6:45 a. m.	28.55
Do	7:00 a. m.	28.50
Do	7:45 a. m.	28.50
Do	noon.	28.70
September 27–28	midnight.	29.00

From the beginning of the blow till 7 a. m. the wind was north-northeast. The tide ran flood (opposite to the direction of the wind) until 7 a. m., when the barometer was at its lowest. For about fifteen minutes after 7 a. m. there was a lull in the wind; then it shifted to the south-southwest and blew with terrific force. The barometer began to rise, and the tide ran ebb with the same force it had run flood, the tide again running in the direction opposite to the wind.

The facts, to my mind, fully prove the theory that the low barometer made the high tide, and that the wind did not force the tide in, as is the usual belief. In each case the wind was blowing with terrific force in the opposite direction to that in which the tide was running. Furthermore the tide ran flood as long as the barometer dropt and when the barometer began to rise the tide began to run ebb.

Do you think that the low barometer and the lull in the storm indicate that we were in the center of the storm at Scranton?

The destructive tides that attend storms on our Atlantic and Gulf coasts are due in part to what are known as storm waves that are projected from the vortexes of atmospheric disturbances in which barometric gradients are very steep, and depend partly upon the force and duration of the wind from certain points of the compass. In the case of the storm of September 17 on the South Carolina coast, the duration of the onshore winds was too brief to cause a dangerous tide before the wind shifted to westerly. In the storm of September 26–27 on the middle Gulf coast, places on and near the coast west of the point where the vortex of the storm crost the coast line experienced only northerly, or offshore, gales; and the storm wave alone, as of the South Carolina storm, was not in itself especially destructive. To the eastward of the path of the storm, however, low-lying coastal tracts were subjected to the storm wave plus the waves driven in from the Gulf by a southerly, or onshore gale.

In the MONTHLY WEATHER REVIEW for May, 1896,[1] Gen. E. P. Alexander, of Georgetown, S. C., gives results of a study of the destructive forces on land of tropical storms that reach the Gulf and Atlantic coasts during the hurricane season, and suggests means of protection against the winds and waves that sometimes attend these storms. The following are extracts from the article referred to:

The maximum velocity of the hurricane wind has been known to

[1] Vol. XXIV, pp. 153–6.

exceed the rate of 120 miles an hour, but this is only in puffs of a few seconds' duration, as the total movement of the wind for a whole hour rarely exceeds 60 miles. Now, wind pressure is usually estimated at 2 pounds per square foot of surface when blowing perpendicular to that surface with a velocity of 20 miles per hour, 8 pounds for 40 miles, and 18 pounds for 60 miles, the pressure increasing as the square of velocity. [It will be observed that during the Gulf storm of September 26–27, 1906, the wind maintained a velocity of 70 miles at Pensacola for a whole hour.] If we assume the highest velocities and calculate the pressures by this rule, we should expect few ordinary houses to resist them. But in the wake of a storm, a study of the structures which fail and of those which resist is generally calculated to surprise an observer far more by the apparently weak ones which have resisted the winds than by the apparently substantial ones which have failed. And when those which have failed are examined, it will be found, almost invariably, that failures are due to unstable foundations or to lightly attached roofs. In fact, it may be taken as a measure of the force of hurricane winds that the frame of any ordinary house will resist them. But the foundations must be firm and the roofs fairly well framed and attached. In new houses, by the use of wooden ceilings instead of plastering, and a few angle irons and bolts, one can easily have a structure like a double box, which could be almost rolled over without injury. Old houses, badly constructed and with poor foundations, may be easily preserved by a few stout braces or inclined props on sides opposite the wind. In short the wind of a cyclone by itself seldom works serious injury. It is only where it has the water as an ally and accumulator of its forces that its ravages are great. When a hurricane passes inland it soon becomes little more than a bit of very bad weather. Its great instrument of destruction is the so-called tidal wave or storm tide, or, more properly, storm wave, which is raised by it and which submerges the low land of the coast. Below the limit to which these waves rise is the zone of danger in a hurricane; above it is the zone of easily attained safety.

How far this danger line may extend above ordinary high water depends so largely upon local configuration of coasts that it is only to be determined for any locality by observation. Unfortunately reliable measurements and data upon this point are rare and difficult to obtain. Popular accounts are always exaggerated, being largely based upon the action of surface billows, which send water and drift far above the general level of the storm wave. A vessel, for instance, drawing eight feet may be carried by successive billows across a marsh submerged only four feet beneath the general level. I have read accounts of combined storm waves and high tides rising ten or twelve feet above ordinary high-water mark, but when the action of billows is eliminated and careful measurements are made, the highest record of a storm tide above ordinary high water which I have been able to find anywhere is 8.2 feet. This limit was reached at Fort Pulaski, Ga., in the great gale of August 27, 1893, which broke all records in the height of its waters, in the destruction of life and property, and in the measured velocity of its wind, which at Charleston, for a few moments, exceeded 120 miles an hour. As this gale is one of great interest, the reader is referred to the records published in the MONTHLY WEATHER REVIEW for October, 1893, page 297.

The following table shows the rise of the tide caused by this hurricane, and for comparison, also, the highest storm tides ever recorded at several Gulf, Atlantic, and Lake ports, as shown by records of the U. S. Coast Survey and Engineer offices.

Highest storm tides at various points.

Locality.	Date.	Height of tide.	Moon's age.
		Feet.	*Days.*
Boston, Mass.	April 16, 1851	5.3	15
Sandy Hook, N. J.	September 10, 1889	3.9	14
Fort Monroe, Va.	March 10, 1846	5.1	12
South Island, S. C.	October 13, 1893	6.8	2
Fort Sumter, S. C.	August 27, 1893	6.4	14
Fort Pulaski, Ga.	August 27, 1893	8.2	14
Mobile, Ala.[3]	October 2, 1893	7.0	20
Buffalo, N. Y.	January 9, 1889	8.0	6
Duluth, Minn.	September 28, 1895	4.0	9

The plane of reference is ordinary high water, and the age of the moon is given in each case to indicate whether the storm tide coincided with the normal high tides, which occur at all Atlantic ports about each full or new moon. There is no tide at Lake ports, and but little in the Gulf.

From the above we see that the serious ravages are committed by the water rather than by the wind, and that they are confined to a narrow zone seldom, if ever, reaching more than eight or nine feet above the plane of ordinary high water. Above that zone ordinarily well built houses will easily resist the winds if the house and the roof are securely framed together and the foundations are stable. If there are weak points, even cheap and ordinary props or braces which can be improvised rapidly, are very effective in breaking up vibrations and resisting the pushes and shakes of the wind. Within the zone of danger from water, the dash of the waves and the tendency of the water to lift and float all wooden structures must be provided for. The limits of this article do not permit a full discussion of the magnitudes of these dangers and the various means by which they may be met, but it may be said briefly that pile foundations, or the equivalent, posts framed into buried timbers, are at once cheap and efficient.

[3] The tide of September 27, 1906, at Mobile, is reported to have been about one foot higher than that of 1893.—*E. B. G.*

WEIGHT OF SLEET ON SUSPENDED WIRES, CABLES, AND BRIDGES.

The breakage of telegraph lines and cables by the weight of the accumulated sleet, ice, and snow led us some years ago to ask that observers send to the MONTHLY WEATHER REVIEW some observations on the weight of sleet actually observed in ordinary and extreme cases. We now renew the request. Please state the size of wire, or cable, and the weight of ice per linear foot.—*C. A.*

RAINY OR SNOWY WEATHER AS FORETOLD BY HALOS.

It is a well-known fact that rain, snow, and general storms are frequently preceded by the appearance of halos, and especially simple circles around the sun or moon. The relation between these phenomena has been carefully studied in Europe, but I know of nothing especially bearing on this subject in America. Would not many of our observers, both regular and voluntary, do well to look over their past records, and tabulate the dates and hours on which halos were observed, more especially the 22-degree and 45-degree circles around the moon and the sun, with a statement of the weather that followed twenty-four hours later? Doubtless the halo will be a much better guide in predicting the weather in some places than in others.—*C. A.*

MONTHLY REVIEW OF THE PROGRESS OF CLIMATOLOGY THRUOUT THE WORLD.

By C. FITZHUGH TALMAN, U. S. Weather Bureau.

PUBLICATION OF CLIMATOLOGICAL RETURNS FOR THE BRITISH COLONIES.

It appears from a recent report of the British Meteorological Committee[1] that a proposition to provide for the publication, in convenient and accessible form, of the abundant climatological data now accumulating in nearly all the British colonies was recently considered by the Committee, and rejected on the score of expense. Following are extracts from a correspondence on this subject that past between the Colonial Office and the Treasury, which latter now has control of the Meteorological Office thru the newly constituted Meteorological Committee:

Letter from the Colonial Office to the Treasury.

DOWNING STREET,
5th August, 1905.

SIR: I am directed by Mr. Secretary Lyttelton to request you to inform the Lords Commissioners of the Treasury that as the result of an enquiry from the United States Weather Bureau for meteorological information with regard to Weihaiwei, he has had his attention drawn to the absence of any organization for the collection and publication of meteorological returns from the colonies generally, and for affording information to persons making enquiries as to climatic conditions in various parts of the British Empire.

It would appear that to a great extent in response to a circular of the 27th of July, 1895, the Meteorological Office receive a considerable amount of information, as shown in the enclosed print, which could with a little trouble be largely increased. Owing, however, to the want of the necessary clerical assistance most of these valuable returns serve

[1] Great Britain. Meteorological Office. First Report of the Meteorological Committee to the Lords Commissioners of His Majesty's Treasury, for the year ended 31st March, 1906. London, 1906.

no useful purpose, although occasionally tables have been prepared by voluntary assistants, as in the case of the observations for tropical Africa recently classified by Mr. E. G. Ravenstein and officially published for the Meteorological Council.

I am to enclose for their Lordships' information a copy of the correspondence which has taken place on this subject, from which it would appear that the necessary collection and collation of returns, etc., could be done by a clerk at from £150 to £200 per annum under the supervision of the Meteorological Council. Mr. Lyttelton understands that the cost of printing and publication would amount to about the same sum, so that the total cost should not be more than from £300 to £400 per annum. This does not seem to be an excessive amount for the performance of work of such importance, both from an economic and from a purely scientific point of view. Mr. Lyttelton would therefore be glad if their Lordships could see their way to sanction the provision on the estimates for 1906–7 of a sum of money for this purpose.

I am to add that Mr. Lyttelton has been approached by the British Association with a proposal for a large scheme involving the creation of a separate office, but after due consideration he has decided that the proposal is not one that he can recommend to their Lordships.

I am, &c., C. P. LUCAS.

The Secretary to the Treasury.

This letter having been referred to the Meteorological Committee, Doctor Shaw as chairman of the committee, replied:

I am authorized by the Meteorological Committee to say that they concur in the opinion expressed by the Council and supported by the Secretary of State, that it is desirable to place upon an organized footing the collection and publication of meteorological statistics of those colonies and dependencies which have no separate meteorological organizations.

They further agree that the simplest method of dealing with the question would be for the Meteorological Office to be definitely charged with the duty of preparing for official publication an annual volume of meteorological statistics for the Crown colonies and dependencies, with such information about the publications of the meteorological organizations of India, Canada, Australia, and South Africa as would enable a reader to find his way to any information that is available about climatic conditions in various parts of the Empire.

The cost to the office involved in carrying out this suggestion would be represented by an appropriation of about £200 for clerical work, on the understanding that the general direction and supervision could be accepted without special provision. The cost of the printing, which does not fall upon the office grant, would be in addition to that sum. The cost of the recently published volume of observations in tropical Africa referred to in the letter from the Secretary of State for the Colonies is reported by the Stationery Office to have been nearly £46.

The committee have carefully considered the allocation of the meteorological grant in order to see whether, under the new conditions, they could find the means for this work, but they find that the maintenance of the work which the office has in hand already will absorb the funds at the disposal of the committee, so that the additional work could only be undertaken if some of the existing work were abandoned. Having regard to the various public interests involved, the committee do not see their way to any immediate modification of the general scheme of operations of the office, and they desire me to express their regret that they have been unable to set aside the necessary sum for the clerical work required for dealing with colonial meteorology in the estimates for the ensuing year.

Thus the meteorological records for some hundreds of thousands of square miles of the earth's surface, including many regions in which climate is a factor of capital importance in the great process of empire-building, still remain almost wholly inaccessible to climatologists.

At present the meteorological returns for a considerable number—in fact, a majority—of the British colonies are represented only by abstracts, of a rather meager description, published in the annual reports of the Colonial Office, the Army Medical Department, and the Board of Trade. Moreover, these voluminous publications, which contain an immense amount of statistical matter not of interest to the meteorologist, are to be found in but few scientific libraries.

A separate periodical publication devoted to the meteorology of the British Empire is a desideratum, and doubtless British meteorologists will eventually see their way to its realization. India, Canada, South Africa, Australia, New Zealand, Mauritius, Hongkong, and a few other colonies are already well provided for, but a large number of minor colonies and dependencies still need provision.

PUBLICATION OF CLIMATOLOGICAL RETURNS FOR THE BRITISH ISLES.

At present there are three bodies which collect and publish climatological data for the British Isles, viz, the Royal Meteorological Society, the Scottish Meteorological Society, and the Meteorological Office, besides the British Rainfall Organization, under the direction of Dr. H. R. Mill, which is the central institution for the collection of rainfall data. The publications of these bodies overlap to a considerable extent; moreover, they are not easily combined for the purposes of the climatologist who wishes to utilize all available material. The subject of initiating a joint system of collection and publication has recently engaged the attention of the Meteorological Committee, and a conference to this end has been held with representatives of the meteorological societies. It is expected that effective progress in the desired direction will have been made by the end of the present year.

CLIMATOLOGY IN THE "HANN-BAND."

From the special volume of the Meteorologische Zeitschrift,[3] issued to commemorate the completion by Doctor Hann of forty years' editorship of that journal, and made up of contributions from Hann's friends and colleagues thruout the world, we select for brief mention the following papers as coming especially within the scope of this column:

Schreiber, Paul. Untersuchung über die Genauigkeit der Tages-, Monats- und Jahresmittel aus den Temperaturbeobachtungen für die drei Stundenkombinationen: 6^a–2^p–10^p, 8^a–2^p–8^p und 7^a–2^p–9^p.

The stations of the Meteorological Institute of Saxony, of which Doctor Schreiber is director, originally made their observations at 6 a. m., 2 p. m., and 10 p. m. In 1883 the hours were changed to 8 a. m., 2 p. m., and 8 p. m.; and in 1901 the hours now generally used in Germany, viz, 7 a. m., 2 p. m., and 9 p. m. were adopted. The author compares the results obtained from these various combinations, with the true means for the year, month, and day, using as his standard a 17-year record, from a self-registering thermometer at Chemnitz. He finds that the first combination gives the best annual means, the second and third the best monthly means, and the first the best daily means. The least satisfactory daily mean is given by the third combination, i. e. (7 a. m. + 2 p. m., + 9 p. m. + 9 p. m.), ÷ 4; in individual cases it may depart as much as 4°C. from the true daily mean.

Augustin, Fr. Die Niederschläge in Prag.

The author compares the results of rainfall measurements at seven points in the city of Prague during the eight years 1897–1904. After reducing these records to a 50-year period, by comparison with observations at the astronomical observatory, he selects that of the Petrinwarte as representing the normal rainfall of the city. This gives Prague an annual rainfall of 529 mm., instead of the 455 mm. that is deduced from a record of over one hundred years at the astronomical observatory, where the exposure of the rain gage is quite unsatisfactory.

There are at present 14 rain gages in operation in Prague and its environs, 11 of which are equipped with self-recording apparatus.

Hepites, St. C. Les sécheresses en Roumanie.

Severe droughts having occurred in Roumania in 1899 and 1903–1904, certain writers were inclined to think that deforestation or some other agency had wrought a change in the climate. The author cites several early chronicles, etc., to show that equally severe droughts have occurred from early times.

Doctor Hepites is the Director of the Meteorological Insti-

[3] Meteorologische Zeitschrift. Hann-Band. Zum vierzigjährigen Redaktionsjubiläum J. Hann's von Freunden und Kollegen gewidmet. Braunschweig, 1906.

tute of Roumania, and the chief authority upon the climate of that country.

Danckelman, von. Die Niederschlagsverhältnisse des Schutzgebietes Togo.

Togo is the most backward of Germany's African protectorates in the matter of rainfall observations. However, in 1905 the rainfall stations numbered 20, of which 12 had been in operation at least four years, so that enough material was available to enable the author to draw some general conclusions.

All stations in Togo show a double period in the rainfall, with maxima in May or June, and August, September, or October; and minima in December, January, or February, and July, August, or September. The second dry period, however, becomes less and less pronounced as one goes north, so that in the northernmost part of the country (where observations have not yet been made) the two rainy seasons probably merge into one. The coast of Togo has a much lighter rainfall than other parts of the Guinea coast, and it is subject to great irregularities. These facts are attributed to the effect of ocean currents, and in order to investigate this theory regular observations of water temperature have been undertaken at Lome, the principal port of the protectorate.

Freiherr von Danckelman is especially interested in the climatology of the German colonies and protectorates, and devotes a great deal of attention thereto in the valuable Mitteilungen aus den deutschen Schutzgebieten, of which he is editor.

Mazelle, Eduard. Temperatur von Triest, nebst einem Beitrag zur Kenntnis des Temperaturunterschiedes Stadt–Land.

The observatory of Trieste, of which Professor Mazelle is Director, was recently moved from the center to the outskirts of the city. On the basis of a year of simultaneous observations at the old and new locations 30-year temperature normals have been computed for the latter. A comparison has also been made with four stations in the surrounding country. While the temperatures recorded at the old location were generally higher than at the country stations, the observatory in its present situation appears to register the natural temperature of this region quite satisfactorily.

Kremser, V. Über die Schwankungen der Lufttemperatur in Norddeutschland von 1851 bis 1900.

After a very careful examination of the temperature observations at some thirty stations, the author concludes that:

> The *temperature variability* in northern Germany and the *difference in temperature* between western and eastern Germany, during the second half of the nineteenth century, agree, in their fluctuations, both with each other and with the frequency of sun spots. They increase quite regularly until some time in the sixties, and then as regularly decrease to the end of the century.

The statement as to the temperature variability applies both to the change in temperature from one year to the next and to the departure of the mean temperature of each year from the assumed normal or mean of the whole series. The net result of the discussion is, therefore, that from 1850 onward the temperature of northern Germany was marked by rapid fluctuations and steep gradients, which reached their maximum in the decade 1861–1870; after which the distribution of temperature both in space and in time became more and more uniform to the end of the century; and that these fluctuations coincide with the march of sun-spot frequency (as obtained by the use of smoothed lustral mean values of the sun-spot relative numbers).

Other interesting papers bearing on climatology are contributed to the "Hann-Band" by Angot (general formula for the diurnal variation of temperature), S. Rona (discussion of the "kossava", a violent southeast wind of southern Hungary), Riggenbach (diurnal period of the rainfall at Basel), von Bezold (distribution of insolation), etc.

METEOROLOGICAL STATIONS IN THE GOLD COAST COLONY, WEST AFRICA.

The accompanying fig. 1 shows the location of the meteorological stations now in operation in the Gold Coast Colony, including its hinterland districts of Ashanti and the Northern Territories. Observations of temperature and rainfall are made at all these stations and the results are transmitted in manuscript to the Meteorological Office, London. A very brief résumé is published annually in the Colonial Reports. A fuller résumé for Accra appears in the annual Statistical Tables Relating to the British Colonies, etc., published by the Board of Trade. Monthly values of temperature and rainfall in 1903 at Accra, Cape Coast, and Kumasi, appeared in the Army Medical Reports for that year.

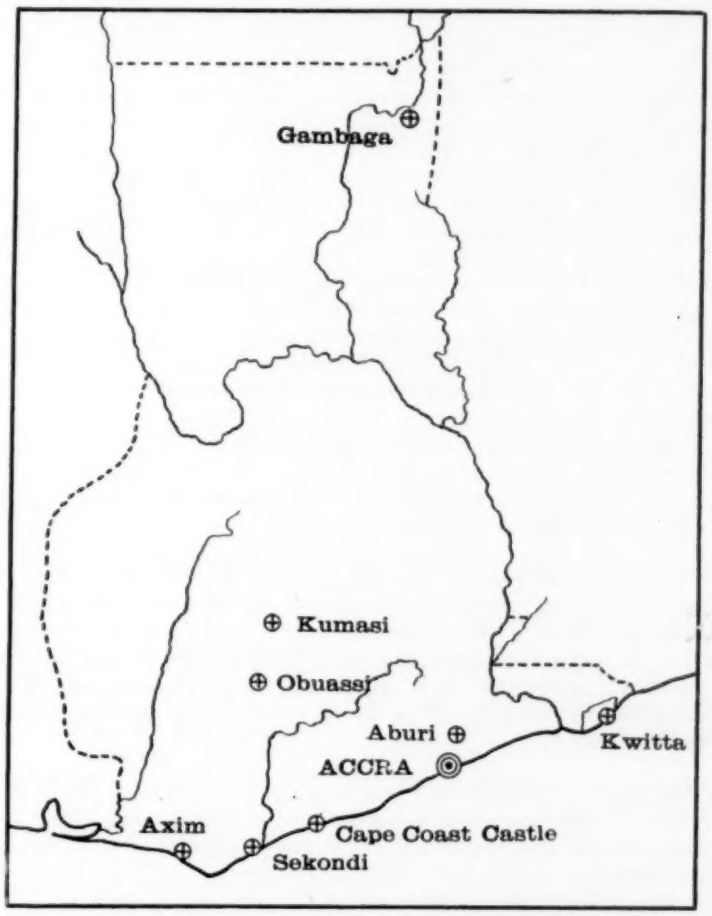

FIG. 1.—Meteorological stations in the Gold Coast Colony (including Ashanti and the Northern Territories).

Other points at which observations have been made are: Elmina and Christainsborg (temperature and pressure normals in Buchan's "Report on Atmospheric Circulation"); Begoro (rainfall values for one year in Supan's "Verteilung des Niederschlags"); Ada (rainfall observations in Colonial Reports, 1897–1898). Normals of pressure, temperature, humidity, rainfall, etc., from two early series of observations on the Gold Coast (Christiansborg, 1829–1842, and Fort Elmina, 1860–1862) appear in Meteorologische Zeitschrift, Bd. IX, 1874, pp. 42–45. (See also last paragraph *infra*.)

In addition to the references on the climate of the Gold Coast contained in Hann's "Klimatologie" the following will be found useful.

For the Gold Coast proper: George Macdonald's "The Gold Coast, Past and Present" (London, 1898), pp. 62–69.

For the Northern Territories: Col. H. P. Northcott's "Report on the Northern Territories of the Gold Coast", published by the Intelligence Division of the War Office (London, 1899).

The last-named work contains brief series of observations, for parts of 1898, at Gambaga, Yabum, Bona, Wa, and Kintampo; also, for part of January, 1899, at Wa.

WEATHER BUREAU MEN AS EDUCATORS.

Mr. W. M. Wilson, Section Director, Ithaca, N. Y., informs us that he gave the usual course of instruction in meteorology and climatology during the latter half of the college year to a class of 23 students. Waldo's Elementary Meteorology and Hann's Climatology were used as text-books. As one of the regular courses of the college of agriculture of Cornell University, it consisted of three lectures each week (one hour each), with laboratory work in drawing weather maps, climatic charts, etc., and taking and recording weather observations. Practise forecasts were made during the latter part of the course from weather maps and from local observations.

The course was considered quite successful altho by no means satisfactory. The facilities for teaching meteorology are at present decidedly poor, but when the new agricultural building is completed, about July, 1907, a suitable laboratory and lecture room with lantern will be provided. There is considerable interest manifested in the subject, and it is stated by Professor Tarr, who has heretofore given a short course in meteorology in connection with the subject of physical geography, that he will withdraw this course for the coming year and advise students desiring instruction in meteorology to take the course offered by the college of agriculture. This action on his part should increase the class and stimulate the interest.

The collection of slides, charts, etc., for illustrative purposes is well under way and it is hoped to make the course in meteorology at Cornell for the coming year worthy of the institution with which it is connected.

Mr. Joseph L. Cline, Observer, Corpus Christi, Tex., reports that the Corpus Christi Board of School Directors and School Superintendent have requested him to deliver one lecture a week on meteorological and kindred subjects to the seniors and subseniors of the local high school during the scholastic year 1906–7; Mr. Cline has given such lectures during the past two years.

Mr. M. L. Fuller, Observer, Canton, N. Y., writes in regard to the elective course in meteorology conducted by him, now given for the first time in the first semester of the college year now opening at St. Lawrence University. As the electives for the first semester are chosen in the preceding spring, which in this case was before the students could know that meteorology would be offered, the difficulty of changing plans has doubtless operated to reduce the size of the class this year.

The announcement in the university catalog relative to the course is as follows:

Geology 7.—Meteorology.—I. Monday, Wednesday, and Friday, at 3 p. m.

This course emphasizes the practical aspects of the subject rather than the technical. The atmosphere is of prime importance in the economics of earth. It has performed a large share in the preparation of the soil; it has directly or indirectly determined to a great extent the growth, development, and distribution of vegetation, animal life, and man; it exerts an important influence upon the occupations, the energy, the prosperity, and enlightenment of peoples.

The movements of the atmosphere thru which it contributes to these results, and the laws governing the movements, were long unknown, but are now in a measure understood, and are being observed and studied thruout the world. The civilized nations are annually expending several million dollars in applying present weather knowledge for the benefit of commerce and the productive industries.

This modern science of meteorology is now offered as an elective in the junior and senior years. The course will cover the ground treated in Davis's elementary text and will include such general topics as—

The atmosphere: temperature, pressure, general circulation.
The moisture of the atmosphere: dew, frost, fog, clouds, rainfall.
General storms: hurricanes, cyclonic storms of temperate latitudes.
Local storms: thunderstorms, hailstorms, tornadoes.
The work of the United States Weather Bureau.
Weather forecasting: principles and practise.
The care and management of meteorological apparatus.
Frost: its formation, prediction, protection from.
Clouds: classification, movements, value in forecasting locally.
The practical application of meteorological knowledge.

The text will be supplemented by lectures, collateral reading, and laboratory work.

The laboratory work will include: the use of meteorological instruments; a series of individual weather observations; the construction of charts, diagrams, weather maps, etc.; weather forecasting.

The following lectures and addresses by Weather Bureau men are reported:

Mr. W. S. Belden of the Vicksburg, Miss., office, while on leave, August 22, 1906, before the Brown County Teachers' Institute, at Hiawatha, Kans., on "The Work of the Weather Bureau".

Mr. M. L. Fuller, of the Canton, N. Y., office, July 18 and 19, 1906, at the Iowa State Normal Summer School, Cedar Falls, Iowa, a special address to the physical geography classes; also two evening lectures, upon "The Weather of the United States and of Iowa" and "The Work of the Weather Bureau; Local Storms"; also July 23 and 24, at the Webster County Teachers' Institute, Fort Dodge, Iowa, the same two lectures.

Mr. H. W. Richardson, September 22, 1906, before the public school teachers and principals of Duluth, Minn., on "The Weather Bureau".

Mr. M. R. Sanford, August 1, 1906, before the professors and students of the Syracuse University Summer School, on "Weather Observations, Charts, and Forecasts".

Mr. J. Warren Smith of the Columbus, Ohio, office, August 22 and 23, 1906, before the Lake County Teachers' Institute at Painesville, Ohio, two lectures on "The Science of the Weather" and "The Daily Atmospheric Survey"; also August 28 and 29, at Cleveland, before the Cuyahoga County Teachers' Institute, the same lectures; also August 24, at Chardon, Ohio, before the Geauga County Teachers' Institute, the second of the lectures.

Mr. P. H. Smyth, September 3, 1906, before the Alexander County Teachers' Institute, at the Cairo, Ill., High School Building, on "U. S. Weather Bureau Forecasts and Warnings".

Mr. Edward L. Wells, August 9, 1906, before the Summer School and Teachers' Institute, at Boise, Idaho, on "Weather Forecasting".

We are glad to say that in some of these cases a slight compensation or honorarium has been granted to our men for their services, and we hope that in many other cases this action will be followed. Weather Bureau employees are paid only for their exacting official services; the extra labor involved in lecturing and teaching, and the special preparation incident thereto, is not imposed upon them as an official duty. Every employee may be relied upon to do what he can to promote the teaching and study of meteorology.—EDITOR.

EDUCATIONAL NOTES.

Prof. Willis I. Milham, of Williams College, Williamstown, Mass., has just published in pamphlet form a syllabus of his course in meteorology. He informs us that after using the syllabus a few years he "may begin to write it up as a text-book".

In the preface to the syllabus it is explained:

This syllabus is intended primarily for the students of Williams College where meteorology is given as a 3-hour elective course for juniors and

seniors during the first half-year. A text-book is used as the basis of instruction but much supplementary material is added in the form of lectures. In order to systematize the work this syllabus, which covers both text-book and lectures, was prepared.

The title is: "Syllabus of a Course on Meteorology", and meteorology is here considered in its broadest sense as the science which deals with all atmospheric phenomena. Some things are thus included which may not be found in all books on meteorology. The subject is divided into 13 chapters, of which the first eight are always treated in every book on meteorology. The last five are treated fully in some books and past over with a few words in others. The chapters are subdivided into sections and the sections into topics. References are given in the syllabus to the four following books: Davis, Elementary Meteorology; Moore, Meteorology; Russell, Meteorology; and Waldo, Elementary Meteorology. * * * No attempt has been made to give references to all the books on meteorology. The reasons for choosing these particular four were: (1) They seem to be the most complete modern text-books. (2) As far as is known to the author, whenever a separate text-book on meteorology is used in any school or college of the United States, one of these four is always chosen.

About forty-five periods are available for the course as given in Williams College, and this time suffices for covering the first eight chapters in detail, and for several lectures on the more important topics in the last five chapters. Davis's book is used at present as the text-book. Practical work in making observations, in deriving generalizations from meteorological statistics, and in making forecasts is required in connection with the course. Short essays or theses on special topics are also sometimes required.

The detailed outline of sections and topics of the first eight chapters was printed in the MONTHLY WEATHER REVIEW, July and April, 1905, Vol. XXXIII, pp. 324 and 159. The revisions since that printing have been very slight, and the most noticeable change is the addition of references to three other texts.

The titles of the chapters are as follows:

I. Introduction – the atmosphere.
II. The heating and cooling of the atmosphere.
III. The observation and distribution of temperature.
IV. The pressure and circulation of the atmosphere.
V. The moisture of the atmosphere.
VI. The secondary circulation of the atmosphere.
VII. Weather bureaus and their work.
VIII. Weather prediction.
IX. Climate.
X. Floods and river stages.
XI. Atmospheric electricity.
XII. Atmospheric optics.
XIII. Atmospheric acoustics.

We are informed by Prof. Charles S. Dolley, of the Department of Biology, Central High School, Philadelphia, Pa., that there is at that school "an opportunity for a competent young man to secure a very desirable position as instructor in physical geography, commercial geography, and the natural history of raw materials".

POPULAR METEOROLOGICAL LECTURES IN ENGLAND.

According to Nature, July 19, a series of popular lectures on meteorology has been given, during the past year, by Mr. W. Marriott, Assistant Secretary of the Royal Meteorological Society, under the auspices of the society itself. The lectures have been given before scientific societies, institutions, and schools; and a list of lectures for the coming season can be obtained by application to Mr. Marriott, at the rooms of the society, No. 70 Victoria street, London, S. W.

The eight lectures to be delivered during the season of 1906–7 will be illustrated with lantern slides. Their titles are as follows:

1. A chat about the weather.
2. Weather forecasting.
3. Rain, snow, hail, and thunderstorms.
4. The upper regions of the atmosphere.
5. Clouds, fog, and sunshine.
6. Climate and health.
7. Meteorology in relation to agriculture.
8. How to observe the weather.

It is so common for American universities to call distinguished Europeans to this country for short courses of lectures on special subjects that we earnestly hope some such institution, or the Chautauqua, will soon invite Mr. Marriott to deliver a course appropriate to an American audience. The popular lectures given in England can doubtless easily be supplemented by technical lectures on a subject with which Mr. Marriott is so familiar. It is always valuable to students to hear a subject treated by different men from different standpoints, and the courses of instruction in meteorology that are given at Harvard, Williams, Amherst, Chicago, and elsewhere would doubtless receive new interest if the students could also listen to Mr. Marriott.

Mr. Marriott has also published a little six-penny pamphlet, entitled "Some Facts About the Weather". From the last section of this pamphlet we learn that all who are interested in the progress of meteorology, ladies as well as gentlemen, are eligible for fellowship in the Royal Meteorological Society. Candidates must be personally known to at least one of the three fellows who recommend them for election. The annual dues are two pounds sterling, or ten dollars, with an entrance fee of five dollars or one pound sterling. Fellows receive the Quarterly Journal and other publications of the society without further payment.

The Editor will be pleased to join in recommending those who desire to join either the Royal Meteorological, the French Meteorological, the Austrian, or the German societies. The publications issued by them are full equivalents for the annual dues.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. KIMBALL, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

Agra and Oudh. Meteorological Reporter.
Annual statement of rainfall, 1905. [Allahabad.] [1906.] (13 pp.) f°.
Administration report. 1905–6. Allahabad. 1906. (4 pp.) f°.
Brief sketch of the meteorology of the United Provinces . . . 1905. Allahabad. 1906. (7 pp.) f°.

Austria. K. k. Hydrographisches Central-bureau.
Jahrbuch 1903. Wien. 1905. v. p. f°.

Batavia. Kon. Magnetisch en Meteorologisch Observatorium.
Observations made at the Royal Magnetical and Meteorological Observatory, 1904. Batavia. 1906. xxxiv, 174 pp. f°.

Besançon. Université. Observatoire.
17me bulletin météorologique. 1901. Besançon. n. d. v. p. 4°.
18me bulletin météorologique. 1902. Besançon. n d. v. p. 4°.

Bibliotheca Geographica.
1902. Berlin. 1905. xvi, 531 pp. 8°.

Buitenzorg. Institut Botanique.
Observations météorologiques 1903–4. n. t. p. n. d. f°.

Cape of Good Hope. Meteorological Commission.
Report. 1901. Cape Town. 1902. xvi, 185 pp. f°.
Same. 1902. Cape Town. 1903. xv, 177 pp. f°.
Same. 1903. Cape Town. 1904. xiv, 197 pp. f°.
Same. 1904. Cape Town. [1905] 27; xv, 119 pp. f°.

Caspari, C[hretien] Ed[ouard].
Les recherches scientifiques à la Tour Eiffel. (Extr. Bull. Soc. astro., Par. Juillet 1906.) Paris. 1906. 9 pp. 8°.

Denmark. Danske Meteorologiske Institut.
Meteorologisk Aarbog for 1903. Kjobenhavn. 1904-5. v. p. f°.
Same. 1904. Pt. 1. Kjobenhavn. 1905. 143 pp. f°.
Same. 1905. Pt. 1. Kjobenhavn. 1906. 143 pp. f°.

Eiffel, G[ustave].
Les observations météorologiques du Weather Bureau de Washington. (Extr. Bull. Soc. astro., Par. Année 1906.) Paris. 1906. 27 pp. 8°.
Types généraux de comparaisons météorologiques appliqués à l'étude des stations de Beaulieu-sur-mer, Sèvres et Vacquey. 1905. Paris. 1905. 71 pp. f°.

Finska Vetenskaps-societeten. Helsingfors.
Bidrag till kännedom af Finlands natur och folk. 61 Häftet. Helsingfors. 1902. xxi, 303 pp. 8°.
Same. 62 Häftet. Helsingfors. 1903. 431 pp. 8°.

Oversigt . . . förhandlingar. 1901–2. Helsingfors. 1902. xxi, 266 pp. 8°.
Same. 1902–3. Helsingfors. 1903. v. p. 8°.

Great Britain. Meteorological Office.
First report of the meteorological committee . . . 1906. London. 1906. 154 pp. 8°.

Hérault. Commission Météorologique.
Bulletin météorologique. 1905. Montpellier. 1906. 140 pp. 4°.

Heredia, Gustavos.
Perturbaciones seismicas registradas en Puebla 1877–1906. Puebla. n. d. n. p. 8°.

Hessler, Adam.
Klimatologie Würzburgs in ihrer Entwickelung. Würzburg. 1906. [153]–239 pp. 8°.

Hjeltström, S. A.
Observationer på snöns temperatur, Bjästa 1885–6, Sundsvall, 1886–7, 1888. Sundsvall. 1906. 39 pp. f°.

Hungary. Magyar Kiralyi Orszagos Meteorologiai és Földmagnességi Intézet.
Die Erdbeben in Ungarn . . . 1903. Budapest. 1906. 43 pp. 8°.
Same. 1904. Budapest. 1906. 59 pp. 8°.
Same. 1905. Budapest. 1906. 28 pp. 8°.

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RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——

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—— Snow in the Sahara. [Note.] P. 557.

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Henry, Alfred J[udson]. Weather forecasting from synoptic charts. Pp. 297–316.

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Störmer, Carl. Les expériences de M. Villard et sa théorie des aurores boréales. Pp. 408–411.

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—— 25 Jahre Geschichte des Berliner Vereins für Luftschiffahrt. Pp 329–380.

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Hopfner, Friedrich. Ueber die Grösse der solaren Wärmemengen, welche in gegebenen Zeiten beliebigen Breiten der Erde zugestrahlt werden Pp. 385–395.
Hopfner, Friedrich. Die tägliche solare Wärmestrahlung auf einer in beliebiger Breite fest gegebenen Flächeneinheit. Pp. 396–401.
Osthoff, H. Der Mammato-Cumulus. Pp. 401–408.
Krebs, W. Der Ponape-Taifun vom 20. April 1905. Pp. 411–413.
—— Jährliche Niederschlagsmengen zu Toronto 1845 bis 1903 und Wasserspiegelschwankungen des Ontario-Sees. P. 413.
Hann, J[ulius]. Sutton: Ueber den täglichen Gang des Barometers zu Kimberley. Pp. 417–418.
Hann, J[ulius]. Temperaturabnahme mit der Höhe auf Spitzbergen. Pp. 418–419.
Hegyfoky, J. Die Frühlingsankunft der Vögel und die Witterung in Ungarn im Zeitraume 1894–1903. Pp. 419–421.
Kerner, Fritz v. Abnahme der Bodentemperatur mit der Höhe im Prologgebirge in Dalmatien. Pp. 421–422.
Prager, —. Ueber die Genauigkeit der graphischen Darstellung des täglichen Ganges der Temperatur. Pp. 422–425.
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—— Zum Klima der Sahara. P. 427.
Hann, J[ulius]. Täglicher und jährlicher Gang der Verdunstung in Südindien. Pp. 428–429.
Hann, J[ulius]. Gang der Bodentemperatur zu Tacubaya (Mexico). P. 430.
Hann, J[ulius]. Täglicher und jährlicher Gang der Bodentemperatur in Tokyo. P. 430.
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Hann, J[ulius]. Regenverhältnisse von Hongkong. P. 432.

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Hellmann, G[ustav]. Verwandlung von Fahrenheitgraden in Centesimalgrade und umgekehrt. P. 487.

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Hecker, Alfred. Die Geschichte der Wettertelegraphie und der Wettervorhersage unter besonderer Berücksichtigung des landwirtschaftlichen Witterungsdienstes. Pp. 193–197.
Lindemann, —. Die meteorologische Station auf dem Fichtelberg 1891–1905. Pp. 197–201.
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Smits, P. J. Wolken-waarnemingen te Batavia gedurende de jaren 1903–1905. Pp. 73–77.
Hi-sink, C. W. De invloed der maan op de onweders. [The influence of the moon on thunderstorms.] Pp. 78–79.

CORRIGENDA.

MONTHLY WEATHER REVIEW for December, 1905, Vol. XXXIII, No. 12, page 526, first column, line 25, omit "Silver thaw"; line 27, read "Glazed frost, or Silver thaw". Also same page, second column, line 17, omit "*or silver thaw*"; line 23, after "*Glazed frost*" insert "*or silver thaw*".

MONTHLY WEATHER REVIEW for April, 1906, Vol. XXXIV, No. 4, page 171, second column, line 25, for "a similar applications", read "a similar application".

MONTHLY WEATHER REVIEW for May, 1906, Vol. XXXIV, No. 5, page 214, first column, line 39, for "and very feeble", read "under very feeble".

MONTHLY WEATHER REVIEW for June, 1906, Vol. XXXIV, No. 6, page 267, second column, in left-hand column of Table 20 (Height in meters), for "7500" read "7000"; also same page, second column, line 9 from bottom, for "n" read "a". Page 269, second column, in left-hand column of Table 36 (Height in meters), for "6008" read "6000". Page 270, first column, in left-hand column of right-hand division of Table 39 ($B-B_0$, N.), line for 8000, for "—076" read "—0.6". Page 280, first column, under title "The Energy of a Storm", for "T. D. Smith, M. D." read "D. T. Smith, M. D."

MONTHLY WEATHER REVIEW for July, 1906, Vol. XXXIV, No. 7, page 315, second column, line 12 from bottom, for "Sierro de Luquillo" read "Sierra de Luquillo". Page 320, Table 15, title: add the words "available to the author in 1904", after the word "records". In the table itself omit the data given for Canóvanas, Perla, and San Juan, and refer to tables 10, 13, and 9, respectively.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Two well-defined and energetic storms appeared in the middle and northern latitudes of the North Atlantic Ocean during September, 1906. The first of these was a West Indian disturbance that is described elsewhere in this number of the MONTHLY WEATHER REVIEW. This disturbance past west and north of Bermuda during the night of the 8–9th, set in over the British Isles on the 13th, and moved thence over Northwestern Europe. The second ocean disturbance of consequence appeared over the Azores September 30 and moved thence northeastward to the British Isles by October 2. Advices were cabled to Lloyds, London, in connection with these storms. The advice dated the morning of September 8 stated that a severe storm would move northeastward from Bermuda, and that of September 30 that a severe storm south of the Azores would probably move northeastward. Aside from dates of the passage of the storms referred to, barometric pressure was notably and persistently high over the middle and eastern portions of the North Atlantic.

In the United States the first decade of September was warm and dry, except in portions of the Southern States and on the north Pacific coast, where heavy rain occurred. A barometric disturbance that appeared on the north Pacific coast on the 5th was attended during the 5th and 6th by the first gale of the fall season. The second north Pacific coast storm prevailed from the 12th to 15th, and the third from the 22d to 24th. On the 23d the first rain of the season fell in the bay counties of California. Attending the eastward and southeastward progress of an area of high barometer that appeared on the extreme north Pacific coast on the 25th, low temperatures and frost were experienced in northern Iowa, northern Nebraska, and southern South Dakota on the morning of the 27th. Attending a second area of high barometer that appeared on the north Pacific coast on the 28th, killing frost occurred in North Dakota on the 29th, and on the 30th frost was reported from the States of the lower Missouri Valley over the upper Lake region, and a minimum temperature of 18° was noted at White River, Ont. The only conspicuously severe and destructive storm of the month in the United States was the disturbance that advanced from the western Caribbean Sea northward over the Gulf of Mexico during the third decade of the month. This storm is described under "The West Indian Hurricanes of September, 1906".

BOSTON FORECAST DISTRICT.

The month, as a whole, was warm and dry, and in many sections, particularly in Maine and New Hampshire, low water in streams, springs, and ponds occasioned much inconvenience to milling and other interests. The highest temperatures of the month were noted generally on the 19th and the lowest on the 25th, light to killing frosts being reported in many sections on the latter date. No heavy windstorms occurred on the coast and shipping suffered little delay on account of weather conditions. Frost warnings were issued to cranberry growers on the 24th, and moderate to killing frosts, with temperature 4° to 6° below freezing, occurred in that region on the morning of the 25th. The warnings were of much value to the cranberry interests. No storms or frost occurred without warnings.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

Weather conditions were moderate, except during the period of the tropical storm that past inland between New Orleans and Mobile on the 26th. Warnings were issued well in advance of this storm, were widely distributed, and precautions were taken to prevent the loss of life and property. (See special report in this number of the REVIEW.) There was no loss of life in this section, and the loss of property was very small when the severity of the storm is considered. Frost warnings were issued for Oklahoma, Okla., and Bentonville, Ark., on the 30th.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISRICT.

The month was one of the wettest Septembers on record, both as regards the great number of rainy days and the remarkably heavy rainfalls that occurred thruout Kentucky and Tennessee. General conditions were sluggish until the 12th when a disturbance moved rapidly across the upper central valleys and the Lake region, closely followed by a strong high barometer area which from the 14th to 17th gave the only clear period of the month. The tropical storm that moved slowly up the Mississippi Valley from the 27th to the 29th gave high winds and heavy rains, but caused no damage of consequence.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

There were no storms of consequence until the 28th when a tropical disturbance caused a severe northeast rainstorm to set in over the upper Mississippi Valley and the southern portion of the upper Lake region. Storm warnings were ordered for Lakes Michigan and Huron, but the increase in the intensity of an area of high barometer in the northwest prevented the northward movement of the storm, and the high winds, which did not set in until the morning of the 29th, were confined to the southern portions of the lakes mentioned. Frost warnings on the 29th and 30th for the upper Lake region, the Missouri and upper Mississippi valleys were followed by general frosts, which were heavy or killing in places. Frost warnings on the 26th for portions of Wisconsin, Minnesota, Iowa, and Nebraska were partly verified.—*H. C. Frankenfield, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

The month was drier than usual except in northern Utah and on the middle eastern slope of the Rocky Mountains. At several stations in southeastern Colorado the rainfall was the greatest on record for September. While the month was generally cooler than usual there was an absence of cold periods,

and killing frosts were confined to high level stations; they were accurately forecast, as were most of the light frosts reported.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

There were moderate rains of the sonora type in the Colorado Valley section on the 14th, 15th, and 16th, and thunderstorms in the extreme southern portion of the State on the 15th. On the 23d a moderate disturbance moved rapidly southward along the coast, and showers occurred from San Francisco northward. Some high winds were reported in the San Joaquin Valley and Nevada with the passage of this disturbance. The month closed with extremely warm weather in the vicinity of Los Angeles.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

As a rule the storms of the month past too far north to cause severe weather in the north Pacific coast States. Rainfall was heaviest—one to two inches above the normal amount—in western Washington and slightly below normal elsewhere. Temperature averaged from one to nearly four degrees above normal. There were two stormy periods, 6th to 8th and 12th to 14th. The maximum wind during the first period was 72 miles an hour from the southeast at North Head and during the second period 64 miles from the southeast at the same station. Light frosts were general the mornings of the 11th and 26th, and they occurred in scattered places on other dates. Timely warnings were issued for all storms and frosts and no casualties or damage of note is known to have occurred.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

There were but few stations where flood stages were recorded during the month, and these were in the southeastern and central Gulf States.

The highest water in the rivers of North Carolina and South Carolina was the result of the heavy rains of the preceding month, altho high water occurred from the 15th to the 20th in these rivers.

During the last few days of the month the heavy rains over the middle Gulf States caused the rivers of that section to rise rapidly. With the exception of the Black Warrior River, flood stages were not reached. In some instances the highest readings were caused by the high wind backing the water upstream. Warnings were issued for the high water in all cases except in the Meridian and Mobile districts where the loss of communication prevented the distribution.

On September 24 the steamer *Lora*, laden with freight from St. Louis, Mo., docked at the wharf in Kansas City, Mo. This event marks the renewal of traffic on the Missouri River, after the lapse of more than a decade.

The highest and lowest water, mean stage, and monthly range at 270 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

THE WEATHER OF THE MONTH.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure for September over the United States and Canada is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and V.

Pressure was high over the entire central portion of the country from the Atlantic to the Pacific, with the crest over the Appalachian region, and diminished rapidly north and south.

The high area over the Ohio Valley and Middle Atlantic States was more pronounced than usual, and extended well into the lower Lake region and New England. On account of the rather persistent presence of high pressure areas over the central sections of the country, the low areas that crost from the Pacific, or that formed on the Rocky Mountain slope, pursued courses well to the north and were not accompanied by severe weather of any description. The barometer averaged unusually low over the lower Mississippi Valley, owing to the passage over that section of the severe and destructive hurricane from the 26th to the 27th and the stormy conditions that prevailed for several days thereafter.

Pressure was also lower than the average over the entire northern border from the Great Lakes to the Pacific and over New England and the Maritime Provinces of Canada.

Under the influence of the high pressure over the Ohio Valley and Lake region the surface winds over the Mississippi Valley and the Great Plains were generally from an easterly quarter, while over New England and along the northern border as far west as the the Rocky Mountains they were from the south.

TEMPERATURE.

The month was one of unusual warmth, altho no extended periods of excessive heat occurred. Over all sections of the United States, except the southern Rocky Mountain and Plateau region, and extending into the Canadian Provinces as far north as observations extend, the temperature averaged well above the normal. Over the Missouri, upper Mississippi and Ohio valleys, and the Lake region the daily average was from 4° to 6° above the normal. The monthly mean temperature was slightly below the average in Nevada, Utah, western Colorado, northwestern Arizona, and southeastern California.

While warm weather was the rule, the daytime temperatures were not excessive, and maximum readings of 100°, or above, were recorded in small areas only. In the upper Missouri Valley temperatures of 100°, or above, were recorded from the 7th to the 9th and unusually high temperatures prevailed over southern California during the closing days of the month. Temperatures below the freezing point were recorded over small sections during the latter part of the month, but over the greater part of the country, including the corn-belt, vegetation was untouched by frost at the end of the month.

PRECIPITATION.

The precipitation was generally ample in all sections of the interior from the Rocky Mountains eastward. Over Nebraska, Colorado, western Kansas, and surrounding districts the precipitation was abnormally heavy for September, which is usually a month of light rainfall.

At Dodge, Kans., the fall for the month, 9.26 inches, was twice the amount recorded in any previous September during the past thirty years. The month was also one of heavy precipitation over the lower Mississippi Valley and east Gulf States. The larger portion of the precipitation over this region occurred, however, during the last few days of the month, attending the passage of the severe tropical storm of the 26th and 27th over that section. Much damage was done by the latter storm from wind and high water, a full account of which will be found in another portion of this REVIEW. The rainy season on the north Pacific coast began early in the month, and amounts far in excess of the average were recorded over the western sections of both Washington and Oregon.

Along the entire Atlantic coast from Maine to Florida the

month was one of very light precipitation. This deficiency was very pronounced over northeastern Florida, where at Jacksonville it amounted to more than six inches. In marked contrast to the above record the amount at Pensacola, in the western section of the same State, was nearly twelve inches above the average.

In nearly all sections the month was one of abundant sunshine, affording ideal conditions for ripening and harvesting.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	9	62.4	+ 1.3	+ 6.8	+ 0.8
Middle Atlantic	13	70.9	+ 3.9	+11.8	+ 1.3
South Atlantic	10	77.1	+ 3.8	+ 4.8	+ 0.5
Florida Peninsula*	8	81.2	+ 1.9	+ 0.8	+ 0.1
East Gulf	8	78.5	+ 3.1	− 3.5	− 0.4
West Gulf	7	78.8	+ 2.9	− 1.3	− 0.1
Ohio Valley and Tennessee	12	72.3	+ 4.1	+ 4.1	+ 0.5
Lower Lake	8	67.2	+ 4.0	+13.5	+ 1.5
Upper Lake	10	64.4	+ 5.1	+18.8	+ 2.1
North Dakota*	8	62.8	+ 5.4	+20.0	+ 2.2
Upper Mississippi Valley	13	69.1	+ 4.5	+ 7.5	+ 3.8
Missouri Valley	11	67.9	+ 2.7	+10.4	+ 1.2
Northern Slope	7	60.7	+ 2.6	+ 9.3	+ 1.0
Middle Slope	6	68.0	+ 0.3	+ 1.3	+ 0.1
Southern Slope*	6	72.1	− 0.2	− 9.3	− 1.0
Southern Plateau*	13	68.9	− 0.8	− 0.1	0.0
Middle Plateau*	8	60.2	− 1.2	− 1.2	− 0.1
Northern Plateau*	12	61.0	+ 2.7	+15.2	+ 1.7
North Pacific	7	57.7	+ 0.6	+11.7	+ 1.3
Middle Pacific	5	63.0	+ 0.1	+ 9.5	+ 1.1
South Pacific	4	69.2	+ 0.8	+ 6.8	+ 0.8

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Prof. R. F. Stupart says:

The temperature was average or slightly below in the eastern portion of Quebec and over the Maritime Provinces, also in a considerable portion of British Columbia; elsewhere in the Dominion the average was exceeded, and in most districts to a marked extent. Alberta was from 1° to 4° above the average, Saskatchewan 2° to 7° above, Manitoba 7° above, Ontario 2° to 6 ° above. Toronto recorded the warmest September on record but one, that of 1881.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	9	2.57	81	−0.6	−1.0
Middle Atlantic	13	1.61	43	−2.1	+0.4
South Atlantic	10	3.65	72	−1.4	−1.4
Florida Peninsula*	8	4.57	60	−3.0	+6.0
East Gulf	8	9.77	266	+6.1	+1.8
West Gulf	7	3.08	81	−0.7	−7.3
Ohio Valley and Tennessee	12	4.60	153	+1.6	−3.8
Lower Lake	8	2.39	80	−0.6	−4.1
Upper Lake	10	3.42	97	−0.1	−2.2
North Dakota*	8	0.93	90	−0.1	+2.0
Upper Mississippi Valley	13	3.97	121	+0.7	−0.5
Missouri Valley	11	4.01	154	+1.5	+0.9
Northern Slope	7	1.57	162	+0.6	+2.1
Middle Slope	6	4.28	240	+2.5	+2.0
Southern Slope*	6	3.49	130	+0.8	+4.0
Southern Plateau*	13	0.98	111	+0.1	+3.0
Middle Plateau*	8	1.24	148	+0.4	+4.4
Northern Plateau*	12	0.58	59	−0.4	−0.3
North Pacific	7	4.31	148	+1.4	−6.9
Middle Pacific	5	0.36	47	−0.4	+4.1
South Pacific	4	0.05	100	0.0	+6.4

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Professor Stupart says:

The chief characteristics of the precipitation for September were the unusually heavy rainfalls in the lower mainland of British Columbia and in Cariboo, and the deficiency of the rainfall in the Western Provinces generally, also in the more northern and eastern portions of Ontario, as well as over the greater portion of the Maritime Provinces. In the Peninsula of Ontario the average amount was exceeded in some localities and was not maintained in others, whereas in Quebec it was average in the western and exceeded the average by from one to two inches in the eastern portion. The most noticeable positive departures were: New Westminster, 6.3 inches; Barkerville, 4.6 inches; and the most pronounced negative departures, Calgary, 1.3 inches; Medicine Hat, 1.1 inches; Port Arthur, 2.3 inches; White River, 2.2 inches; Rockliffe, 1.1 inches; St. Johns, 1.3 inches; Sydney, 1.3 inches.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	78	− 3	Missouri Valley	73	+ 7
Middle Atlantic	79	+ 2	Northern Slope	63	+ 8
South Atlantic	84	+ 4	Middle Slope	72	+14
Florida Peninsula	79	− 3	Southern Slope	74	+11
East Gulf	86	+10	Southern Plateau	45	+ 6
West Gulf	80	+ 6	Middle Plateau	48	+10
Ohio Valley and Tennessee	80	+ 8	Northern Plateau	46	− 6
Lower Lake	73	0	North Pacific	78	+ 6
Upper Lake	78	+ 1	Middle Pacific	62	− 5
North Dakota	70	+ 4	South Pacific	65	− 1
Upper Mississippi Valley	77	+ 5			

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	4.1	− 0.9	Missouri Valley	4.5	+ 0.1
Middle Atlantic	4.8	0.0	Northern Slope	3.5	− 0.5
South Atlantic	5.0	+ 0.2	Middle Slope	4.3	+ 1.1
Florida Peninsula	4.1	− 1.4	Southern Slope	4.4	+ 0.8
East Gulf	6.1	+ 1.7	Southern Plateau	1.9	− 0.4
West Gulf	5.0	+ 0.7	Middle Plateau	3.0	+ 0.5
Ohio Valley and Tennessee	5.6	+ 1.2	Northern Plateau	3.4	− 0.7
Lower Lake	3.6	− 1.2	North Pacific	6.2	+ 0.3
Upper Lake	4.3	− 0.8	Middle Pacific	3.1	+ 0.3
North Dakota	4.4	+ 0.1	South Pacific	2.0	− 0.5
Upper Mississippi Valley	4.6	+ 0.4			

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Birmingham, Ala.	27	50	se.	Point Reyes Light, Cal.	9	50	nw.
Cape Henry, Va	16	50	n.	Do	12	57	nw.
Memphis, Tenn.	22	60	nw.	Do	13	74	nw.
Mobile, Ala.	27	55	e.	Do	23	58	nw.
Mount Tamalpais, Cal.	12	70	nw.	Do	24	65	nw.
Do	13	61	nw.	St. Paul, Minn	25	50	w.
Do	23	50	nw.	Sand Key, Fla	24	54	se.
Do	24	56	nw.	Do	25	50	se.
North Head, Wash.	5	50	se.	Tatoosh Island, Wash.	5	58	s.
Do	7	74	se.	Do	6	54	s.
Do	12	62	se.	Do	7	54	s.
Pensacola, Fla.	26	52	ne.	Williston, N. Dak.	15	50	w.
Do	27	83	e.	Wilmington, N. C.	17	50	ne.

CLIMATOLOGICAL SUMMARY.

By Mr. JAMES BERRY, Chief of the Climatological Division.

TEMPERATURE AND PRECIPITATION BY SECTIONS, SEPTEMBER, 1906.

In the following table are given, for the various sections of the Climatological Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.							Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.					Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest. Date.			Station.	Amount.	Station.	Amount.
Alabama	78.2	+3.6	Newberne	100	13	Hamilton	58 16	8.44	+5.93	Daphne	14.75	Selma	3.70
Arizona	73.5	−1.1	Aztec	112	30	Quakingasp	23 17	0.43	−0.79	Fort Apache	2.53	12 stations	0.00
Arkansas	75.7	+2.5	Heber	100	5, 16	Harrison	47 30	6.24	+2.88	Jonesboro	12.27	Junction	2.33
			Jonesboro	100	15								
California	68.6	+0.5	Mammoth Tank	113	4	Tamarack	25 16	0.25	−0.21	Woodleaf	3.90	Many stations	0.00
Colorado	57.4	−0.9	Holyoke	98	6	3 stations	19 17	2.47	+1.23	Antelope Springs	4.24	Fort Morgan	0.79
Florida	80.8	+1.7	Orange City	100	4	Molino	60 17	5.80	−1.85	Galt	19.30	Lake City	1.04
						Stephenville	60 10						
Georgia	77.5	+2.8	Fleming	100	14	Clayton	54 9	5.29	+1.65	Clayton	13.72	Resaca	0.35
Hawaii	74.9†		Kihei, Maui	94	11	Hamuula, Hawaii	39 19	3.92‡		Honomanu, Maui	16.85	2 stations	0.00
Idaho	59.2	+2.2	Garnet	100	3	Lake	10 12	0.53	−0.35	American Falls	1.48	Chesterfield	T.
Illinois	70.8	+3.8	3 stations	98	2, 17	Lanark	38 27	5.10	+1.86	Yorkville	10.25	2 stations	2.31
Indiana	70.4	+3.5	4 stations	96	4 dates	Bluffton	39 25	4.07	+1.47	Madison	9.12	Bluffton	1.20
Iowa	67.2	+3.4	Clarinda	100	9	Washta	27 30	4.16	+0.85	Thurman	11.10	Mount Vernon	0.64
Kansas	70.4	+1.4	5 stations	100	8, 9	Farnsworth	28 30	3.81	+0.81	Macksville	10.20	Norton	0.50
Kentucky	73.0	+2.8	Loretto	95	8	Williamstown	45 15	6.15	+3.55	Franklin	12.67	Maysville	2.55
			Maysville	95	11								
Louisiana	77.9	+2.5	Alexandria	102	13	Collinston	57 30	5.10	+1.37	Houma	10.59	Lake Charles	1.25
						Farmerville	57 30						
Maryland and Delaware	70.8	+3.0	Millsboro, Del.	98	11	Oakland, Md.	36 15	1.28	−1.78	Oakland, Md.	3.74	J. H. Hospital, Balto.	0.22
Michigan	64.9	+5.0	Ironwood	99	8	Wetmore	22 1	2.24	−0.92	Holland	6.75	Pontiac	0.34
Minnesota	63.3	+4.4	New London	99	7, 8	International Falls	24 30	3.73	+0.92	Long Prairie	7.61	Hallock	0.87
Mississippi	78.3	+3.0	Aberdeen	101	14, 15	Ripley	59 1	9.17	+5.80	Columbia	16.70	Woodville	4.09
Missouri	71.9	+3.7	Princeton	98	9	Bethany	36 27	4.15	+0.39	Marble Hill	9.31	Trenton	0.27
Montana	58.4	+3.1	Plentywood	105	6	Grayling	14 26	1.04	−0.08	Marysville	2.99	2 stations	T.
Nebraska	64.6	+0.8	Lynch	103	7	Winnebago	26 29	3.33	+1.09	Wahoo	9.77	Stratton	0.74
Nevada	60.4	+0.3	Logan	103	20	Squaw Valley	18 11	0.30	−0.09	Squaw Valley	1.12	5 stations	0.00
New England*	61.8	+1.7	Cavendish, Vt.	97	10	3 stations	24 25	2.36	−1.21	Narragansett Pier RI	5.42	Portland, Me.	0.58
New Jersey	68.9	+3.0	3 stations	94	10, 19	Layton	33 25	2.19	−1.70	Rancocas	4.66	Asbury Park	0.75
New Mexico	63.5	−0.6	Carlsbad	99	12	Elizabethtown	25 19	1.68	−0.38	Cloudcroft	5.44	Artesia	0.00
			San Marcial	99	13								
New York	64.0	+3.6	Elmira	102	10, 19	Bouckville	25 25	2.74	−0.22	Watertown	6.27	Palermo	0.79
North Carolina	74.0	+3.6	Pinehurst	99	9	Buck Spring	35 29	4.38	+0.32	Horse Cove	22.46	Kinston	0.59
			Sloan	99	15								
North Dakota	62.8	+5.4	Larimore	109	7	Pratt	20 29	1.20	+0.20	Forman	3.19	New England	0.01
Ohio	68.9	+3.4	Marion	98	18	South Lorain	36 15	2.92	+0.21	Hudson	6.82	Lima	0.48
Oklahoma and Indian Territories.	74.0	+0.3	S. McAlester, Ind. T.	99	20	Taloga, Okla.	36 30	4.06	+1.20	Stillwater, Okla.	9.00	Vinita, Ind. T.	1.17
Oregon	60.1	+1.6	Umatilla	100	19	Granite	20 11	2.20	+0.68	Nehalem	10.72	Warmspring	0.14
						Prospect	20 14						
Pennsylvania	67.6	+3.3	Irwin	99	17, 18	Pocono Lake	30 25	2.46	−0.77	Saegerstown	6.57	Philadelphia (a)	0.36
Porto Rico	78.3		Adjuntas	101	9	Corozal	56 8	10.59		Isolina	19.12	Guanica Central	5.29
South Carolina	78.0	+2.9	Blackville	98	2, 6, 11	Greenville	55 9	4.85	+0.80	Walhalla	14.37	Edisto	1.43
South Dakota	63.6	+2.5	Cherry Creek	103	7	Pine Ridge	29 26	3.37	+1.66	Elk Point	12.18	Fort Meade	0.12
			Kennebec	103	8								
Tennessee	74.6	+4.2	Cedar Hill	98	19	Silver Lake	47 8	6.46	+3.52	Lafayette	12.97	Leadvale	1.10
Texas	77.4	+1.2	Tilden	104	3	Nazareth	39 30	3.47	+0.25	Sonora	8.00	Kent	T.
Utah	59.6	−0.7	Alite	99	6	Alta	20 17	1.33	+0.54	Parowan	3.49	Snowville	0.27
Virginia	71.6	+3.4	3 stations	95	8, 9	Lincoln	41 25	2.24	−1.22	Speer's Ferry	6.48	Petersburg	0.14
						Milford	41 25						
Washington	59.6	+1.4	Zindel	99	19	Wilbur	16 10	3.04	+1.34	Quinlault	19.55	Trinidad	T.
West Virginia	69.9	+3.3	Romney	97	10, 18	Bayard	38 25	3.25	+0.13	Pickens	5.44	Harpers Ferry	0.57
Wisconsin	64.5	+4.6	Meadow Valley	96	9	4 stations	26 30	3.57	+0.11	Racine	7.30	Menasha	1.57
Wyoming	55.4	+0.9	Alcova	100	8	South Pass City	12 12	1.28	+0.50	Moore	3.77	Fort Washakie	0.20

*Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. †47 stations, with an average elevation of 757 feet. ‡145 stations.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

For description of tables and charts see page 38 of REVIEW for January, 1906.

Charts VII and VIII for September, 1906, omitted.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, September, 1906.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.					Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							62.4	+ 1.3											78	2.57	— 0.6									4.1	
Eastport	76	69	85	29.95	30.03	.00	56.9	+ 1.1	76	19	64	38	25	50	22	52	49	77	0.78	— 2.4	7	7,392	sw.	28	w.	1	15	8	7	4.5	
Portland, Me.	103	81	117	29.95	30.07	+ .02	59.8	+ 0.1	82	6	68	38	25	52	32	55	51	75	0.58	— 2.5	7	6,699	s.	33	nw.	3	15	10	5	3.6	
Concord	288	70	79	29.77	30.08	+ .02	61.6	+ 1.4	90	18	75	31	25	48	37	....	....	....	1.19	— 2.0	8	3,409	nw.	29	nw.	3	15	9	6	3.4	
Burlington	404	12	47	29.64	30.07	+ .01	60.0	— 1.4	83	9	70	33	25	50	33	....	....	....	3.59	0.0	10	8,432	s.	40	nw.	9	15	4	11	4.5	
Northfield	876	16	70	29.16	30.10	+ .04	57.0	+ 1.0	86	9	71	26	25	43	39	53	52	88	1.87	— 0.9	11	5,627	s.	36	nw.	3	13	10	7	4.9	
Boston	125	115	188	29.95	30.09	+ .02	65.0	+ 2.6	90	18	73	44	25	57	28	59	55	73	2.64	— 0.3	8	6,732	sw.	28	sw.	3	19	5	6	3.5	
Nantucket	12	14	90	30.07	30.08	.00	63.8	+ 1.1	85	19	70	49	26	58	21	59	57	80	2.72	— 0.6	8	10,847	sw.	43	ne.	15	10	14	6	5.0	
Block Island	26	11	46	30.06	30.09	+ .01	64.7	+ 1.1	80	19	70	51	5	59	19	61	59	83	2.08	— 0.8	9	10,735	sw.	37	ne.	15	15	9	6	3.9	
Narragansett	....	9	....	....	....	....	64.0	+ 1.8	88	19	72	42	5	56	27	....	....	....	5.42	+ 2.2	10	.....	w.	....	.....	..	21	2	7	....	
Providence	160	57	67	29.92	30.10	+ .03	64.6	+ 0.8	92	19	74	42	25	55	29	59	55	76	3.18	.....	6	4,184	sw.	20	w.	3	18	6	6	3.9	
Hartford	159	122	132	29.92	30.09	+ .02	65.6	+ 3.6	92	19	76	39	25	55	31	59	55	74	3.57	.....	7	4,664	s.	25	sw.	2	11	12	7	4.7	
New Haven	106	116	155	29.98	30.09	+ .02	66.4	+ 2.9	90	19	76	43	25	57	27	61	57	77	4.82	+ 1.1	6	6,033	sw.	27	ne.	15	15	9	6	3.4	
Mid. Atlantic States.							70.9	+ 3.9											79	1.61	— 2.1									4.3	
Albany	97	102	115	29.99	30.09	+ .02	65.8	+ 2.7	90	9	76	40	25	55	30	59	55	75	1.57	— 1.8	6	5,375	s.	26	s.	26	14	11	5	3.9	
Binghamton	875	79	90	29.18	30.10	+ .03	63.8	+ 2.5	91	11	76	34	25	52	37	....	....	....	1.98	— 1.1	8	3,327	ne.	21	n.	3	16	5	9	4.0	
New York	314	108	350	29.76	30.09	+ .01	70.2	+ 4.3	90	10	77	54	16	64	23	63	59	72	2.54	— 1.2	8	7,551	ne.	35	ne.	15	13	8	9	4.4	
Harrisburg	374	94	104	29.71	30.11	+ .03	69.6	+ 5.2	90	8	78	47	25	61	27	62	58	73	2.39	— 1.7	9	3,654	ne.	27	se.	11	11	11	8	4.6	
Philadelphia	117	116	184	29.98	30.10	+ .02	71.2	+ 4.1	91	10	79	51	25	64	25	64	60	73	0.36	— 2.9	7	6,829	sw.	27	n.	30	12	9	9	5.0	
Scranton	805	111	119	29.24	30.10	+ .03	66.2	.....	89	11	77	42	25	56	33	59	55	78	2.00	.....	9	4,410	sw.	24	n.	30	15	8	7	3.8	
Atlantic City	52	37	48	30.04	30.09	+ .02	70.6	+ 3.9	91	10	76	56	6	65	22	65	63	80	2.94	— 0.6	8	5,945	ne.	26	ne.	15	7	12	11	5.6	
Cape May	17	48	52	30.09	30.11	+ .04	70.4	+ 2.3	87	10	76	50	25	65	18	66	....	....	1.18	— 2.4	8	.....	s.	....	.....	....	10	12	8	4.9	
Baltimore	123	69	117	29.96	30.09	+ .01	72.4	+ 4.5	94	10	81	51	25	64	28	65	61	73	0.32	— 3.6	7	4,574	ne.	22	w.	3	8	10	12	6.0	
Washington	112	59	76	29.97	30.09	+ .01	72.9	+ 5.1	94	11	83	50	25	63	31	66	65	83	0.60	— 3.1	9	2,826	ne.	15	nw.	3	12	9	9	5.1	
Cape Henry	18	11	58	30.06	30.08	+ .02	76.0	+ 4.2	93	11	81	66	25	71	20	....	....	....	0.55	— 4.0	7	10,375	ne.	50	n.	16	12	13	5	4.5	
Lynchburg	681	83	88	29.37	30.10	+ .02	72.4	+ 3.4	93	9	82	52	25	63	33	66	65	86	2.34	— 1.5	10	2,317	ne.	18	nw.	12	6	15	9	5.9	
Mount Weather	1,725	10	57	28.32	30.11	+ .04	66.0	.....	84	9	73	47	25	59	21	61	58	82	1.27	.....	8	8,478	nw.	35	nw.	3	12	11	7	4.7	
Norfolk	91	102	111	29.99	30.08	+ .02	75.8	+ 4.7	92	11	82	64	25	69	20	70	68	82	0.66	— 3.9	7	6,219	ne.	29	ne.	16	13	11	6	4.6	
Richmond	144	145	153	29.95	30.10	+ .03	73.6	+ 3.2	93	11	83	52	25	64	26	....	....	....	0.35	— 3.5	8	5,293	n.	29	nw.	30	11	13	6	4.5	
Wytheville	2,293	40	47	27.76	30.09	+ .02	67.8	+ 4.2	86	9	76	52	9	59	34	63	62	91	4.81	+ 1.4	21	2,540	e.	20	w.	13	8	10	12	6.1	
S. Atlantic States.							77.1	+ 3.3											84	3.65	— 1.4									5.0	
Asheville	2,255	53	75	27.77	30.06	— .01	69.7	+ 4.4	84	20	78	52	9	62	31	65	64	90	5.72	+ 2.4	19	4,578	se.	30	e.	18	3	15	12	6.7	
Charlotte	778	68	76	29.26	30.08	+ .01	74.5	+ 3.4	90	8	82	61	16	67	28	68	66	83	2.40	— 1.0	12	4,725	ne.	32	ne.	17	8	11	11	5.9	
Hatteras	11	12	47	30.05	30.06	.00	78.3	+ 4.6	88	10	83	68	24	74	15	73	71	84	3.00	— 3.4	6	9,769	ne.	39	ne.	16	21	5	4	3.3	
Raleigh	376	71	79	29.68	30.07	.00	75.6	+ 5.1	94	9	84	57	25	67	29	68	66	80	3.29	+ 0.1	9	4,556	n.	24	n.	17	11	13	6	4.7	
Wilmington	78	81	91	29.95	30.03	— .02	77.4	+ 3.8	94	10	85	62	8	70	28	72	70	86	3.41	— 3.0	10	5,432	ne.	50	ne.	17	7	19	4	4.8	
Charleston	48	14	92	29.99	30.04	.00	79.6	+ 3.6	91	4	85	69	17	74	19	74	72	83	3.31	— 3.3	13	7,827	s.	48	sw.	17	10	15	5	4.7	
Columbia, S. C.	351	41	57	29.67	30.04	— .01	77.7	+ 2.7	92	3	86	63	9	69	29	70	68	81	3.64	— 0.5	11	4,889	ne.	44	ne.	17	10	13	7	5.2	
Augusta	180	89	97	29.84	30.03	— .02	78.2	+ 3.8	93	14	86	62	9	70	28	72	70	84	6.92	+ 3.0	10	4,197	ne.	32	se.	1	7	14	9	5.5	
Savannah	65	81	89	29.96	30.03	.00	79.4	+ 3.6	95	4	86	67	16	72	23	73	71	84	2.55	— 3.6	12	4,944	s.	27	e.	25	12	10	8	5.0	
Jacksonville	43	101	129	29.94	29.99	— .01	80.1	+ 2.5	93	14	86	65	16	74	18	74	72	83	2.29	— 6.1	10	5,821	se.	33	se.	26	14	12	4	4.3	
Florida Peninsula.							81.7	+ 1.1											79	6.20	— 2.1									4.1	
Jupiter	24	10	48	29.93	29.96	.00	81.2	+ 1.6	89	6	87	71	17	76	17	76	74	81	8.37	— 1.2	10	8,689	se.	37	se.	26	13	12	5	4.7	
Key West	22	10	53	29.90	29.92	— .02	82.6	+ 0.1	91	17	87	71	30	78	16	76	73	75	5.09	— 2.3	17	7,420	e.	35	se.	24	18	7	5	4.2	
Sand Key	25	41	71	29.88	29.92	— .02	82.2	.....	91	16	86	69	17	79	18	....	....	....	3.42	.....	12	11,675	e.	54	se.	24	18	8	4	3.9	
Tampa	35	79	96	29.92	29.95	— .02	81.3	+ 1.7	93	2	89	68	4	73	21	74	72	82	5.15	— 2.8	10	5,678	ne.	29	e.	26	20	6	4	3.7	
East Gulf States.							78.5	+ 3.1											86	9.77	+ 6.1									6.1	
Atlanta	1,174	190	216	28.82	30.03	— .02	75.2	+ 3.7	89	4	82	63	17	68	22	69	68	85	4.05	+ 0.3	16	7,149	e.	42	e.	27	6	11	13	6.5	
Macon	370	55	66	29.64	30.03	.00	79.4	+ 3.7	93	14	88	67	17	71	23	....	....	....	4.89	+ 2.3	11	3,069	ne.	24	se.	27	7	14	9	5.9	
Thomasville	273	8	57	29.70	29.99	— .02	79.7	+ 1.8	95	4	89	66	17	71	23	73	72	87	10.91	+ 6.2	11	3,450	e.	26	e.	26	12	13	5	4.4	
Pensacola	56	79	96	29.89	29.95	— .04	80.1	+ 2.6	91	15	86	68	30	74	18	....	....	....	16.48	+11.7	17	7,706	s.	33	e.	27	6	13	11	6.3	
Anniston	741	9	58	29.24	30.02	— .01	76.8	+ 4.0	91	1	85	65	30	68	24	....	....	....	12.20	+ 9.9	17	3,401	se.	24	se.	28	5	8	17	7.0	
Birmingham	700	136	144	29.26	30.01	— .02	77.1	+ 2.2	91	13	84	66	17	70	21	71	69	85	13.19	+10.4	19	5,298	e.	50	se.	27	1	13	16	7.4	
Mobile	57	98	106	29.88	29.94	— .06	80.0	+ 3.2	96	15	87	68	6	73	21	74	72	84	11.78	+ 6.6	17	4,713	ne.	55	e.	27	9	13	8	5.3	
Montgomery	223	100	112	29.75	29.99	— .03	78.9	+ 3.3	94	4	87	66	17	70	23	72	71	86	7.80	+ 4.8	17	4,743	ne.	36	e.	27	6	13	9	5.8	
Meridian	375	84	93	29.57	29.95	— .07	77.8	+ 4.8	92	15	87	64	30	69	24	71	70	86	11.69	+ 8.9	13	3,499	e.	44	ne.	27	12	9	9	5.5	
Vicksburg	247	62	74	29.68	29.96	— .06	78.3	+ 3.0	96	15	86	61	30	70	22	72	71	88	7.07	+ 3.6	18	3,880	se.	29	w.	2	6	13	11	6.0	
New Orleans	51	88	121	29.89	29.94	— .04	80.6	+ 2.3	94	16	87	68	30	74	19	74	72	84	7.40	+ 2.8	15	5,266	s.	49	nw.	27	2	16	12	6.7	
West Gulf States.							78.8	+ 2.9											80	3.08	— 0.7									5.0	
Shreveport	249	77	84	29.70	29.96	— .04	79.0	+ 3.5	94	17	88	60	30	70	24	71	69	81	2.89	— 0.8	11	3,960	se.	27	s.	4	12	10	8	5.1	
Bentonville	1,303	11	44	28.60	29.96	— .06	72.4	.....	90	16	82	51	30	63	28	....	....	....	3.80	.....	12	3,198	s.	17	s.	2	8	11	11	5.9	
Fort Smith	457	79	94	29.50	29.96	— .05	75.9	+ 3.6	93	9	85	56	30	67	28	69	67	82	3.28	— 0.3	9	4,604	e.	31	nw.	28	9	16	5	4.5	
Little Rock	357	93	100	29.60	29.96	— .07	76.5	+ 3.6	93	15	84	55	30	68	23	70	68	84	3.18	0.0	11	4,314	ne.	30	nw.	29	4	11	15	6.6	
Corpus Christi	20	48	53	29.92	29.94	— .01	81.6	+ 2.8	92	26	88	68	30	76	20	75	73	81	3.55	— 1.2	4	6,399	se.	28	ne.	19	18	8	4	3.0	
Fort Worth	670	106	114	29.26	29.96	— .03	77.2	+ 2.0	94	2	86	56	30	68	26	....	....	....	4.16	+ 2.3	10	6,040	s.	27	n.	30	17	8	5	4.1	
Galveston	54	106	112	29.90	29.96	— .02	81.8	+ 2.3	91	8	86	70	28	77	16	75	72	77	2.68	— 3.5	9	6,761	se.	29	n.	26	9	18	3	4.8	
Palestine	510	78	79	29.42	29.94	— .05	78.6	+ 2.9	93	3	88	61	30	70	25	70	68	80	3.14	— 0.1	11	4,384	s.	28	w.	4	3	13	14	6.8	
San Antonio	701	80	91	29.21	29.92	— .04	80.0	+ 2.5	95	3	90	61	29	70	27	70	66	73	1.74	— 1.7	10	4,452	se.	22	n.	26	14	10	6	4.2	
Taylor	583	55	63	29.34	29.95	— .02	78.6	.. ....	95	15	88	59	29	69	29	....	....	....	3.07	.....	10	4,862	nw.	27	n.	3	8	17	5	5.0	
Ohio Val. and Tenn.							72.3	+ 4.1											80	4.60	+ 1.6									5.6	
Chattanooga	762	106	112	29.24	30.04	— .02	75.4	+ 4.7	88	13	82	64	30	68	23	69	68	84	5.48	+ 1.8	19	3,973	ne.	38	se.	28	5	13	12	6.7	
Knoxville	1,004	35	88	29.00	30.04	— .02	74.8	+ 5.5	88	4	83	62	17	66	25	68	67	85	3.82	+ 1.1	17	4,397	ne.	26	w.	21	2	16	12	7.0	
Memphis	399	76	97	29.57	29.98	— .05	76.4	+ 4.3	92	15	83	58	30	70	22	70	68	83	6.71	+ 3.6	11	5,088	sw.	60	nw.	22	11	11	8	5.0	
Nashville	546	79	91	29.45	30.02	— .04	75.9	+ 5.2	92	2	84	61	15	68	27	69	67	82	10.95	+ 6.9	17	3,839	e.	32	e.	28	7	6	17	6.7	
Lexington	989	75	102	29.01	30.06	— .01	70.6	+ 1.7	88	8	78	52	15	63	24	....	....	....	5.03	+ 2.5	17	6,218	ne.	30	se.	29	9	7	14	6.0	
Louisville	525	111	132	29.47	30.05	— .01	73.8	+ 4.4	91	11	83	56	15	65	28	66	64	78	4.12	+ 1.3	14	5,088	n.	24	e.	28	7	12	11	5.7	
Evansville	431	72	82	29.54	30.00	— .06	74.2	.....	92	11	82	56	14	66	28	....	....	....	4.16	.....	11	4,140	ne.	30	s.	28	6	16	8	5.3	
Indianapolis	822	154	164	29.18	30.05	— .01	70.5	+ 4.5	89	18	80	49	30	61	27	63	60	78	4.50	+ 1.6	10	5,811	ne.	35	s.	12	9	14	7	5.0	
Cincinnati	628	152	160	29.39	30.06	— .01	72.4	+ 4.3	90	8	81	53	15	64	25	64	61	74	3.90	+ 1.5	13	4,257	ne.	25	sw.	2	9	13	8	5.5	
Columbus	824	173	190	29.21	30.08	+ .01	70.0	+ 3.9	89	8	80	48	15	60	28	62	59	75	1.59	— 1.0	7	6,374	se.	31	w.	13	9	12	9	5.0	
Pittsburg	842	336	352	29.20	30.09	+ .01	69.6	+ 2.9	90	9	79	50	15	60	30	62	59	74	3.10	+ 0.5	10	5,470	ne.	44	sw.	2	11	12	7	5.0	
Parkersburg	638	77	84	29.43	30.08	.00	71.2	+ 3.0	89	9	81	50	15	62	30	64	61	80	1.79	— 1.1	11	3,129	se.	18	w.	19	11	12	7	4.9	
Elkins	1,940	41	50	28.10	30.12	+ .04	67.5	+ 5.2	88	9	78	45	25	57	35	60	59	88	4.24	+ 0.6	10	2,152	n.	16	ne.	10	10	10	10	5.4	
Lower Lake Region.							67.2	+ 4.0											73	2.39	— 0.6									5.6	
Buffalo	767	178	206	29.26	30.08	+ .02	66.0	+ 3.9	88	12	74	45	25	58	29	61	59	80	3.43	+ 0.1	7	8,163	sw.	38	sw.	3	18	5	7	3.5	
Canton	448	10	71	29.59	30.06	.....	60.6	.....	87	12	72	32	30	49	37	....	....	....	4.35	.....	10	6,786	sw.	33	w.	22	17	10	3	3.5	
Oswego	335	76	91	29.70	30.07	+ .01	64.8	+ 3.1	87	12	74	41	25	56	33	60	57	78	2.19	— 0.6	6	6,488	s.	25	n.	23	21	4	5	2.8	
Rochester	523	81	102	29.52	30.09	+ .03	66.7	+ 4.7	90	18	77	45	25	56	31	58	54	70	2.27	— 0.1	8	4,896	sw.	26	w.	3	18	6	6	3.3	
Syracuse	597	97	113	29.45	30.09	+ .02	65.2	.....	88	11	74	41	25	56	29	....	....	....	1.35	.....	9	7,348	s.	37	w.	3	15	11	4	3.9	
Erie	713	92	102	29.32	30.08	+ .02	66.8	+ 3.2	84	11	74	48	30	59	26	60	55	68	2.53	— 1.4	9	7,328	se.	30	s.	29	16	9	5	4.2	
Cleveland	762	190	201	29.27	30.08	+ .02	67.4	+ 3.6	86	19	75	50	15	60	26	61	57	72	2.38	— 1.1	10	9,789	se.	48	n.	29	11	13	6	4.5	
Sandusky	629	62	70	29.40	30.08	+ .02	68.7	+ 3.6	90	12	77	49	25	60	31	....	....	....	3.12	+ 0.3	6	5,036	ne.	28	ne.	29	17	7	6	3.4	
Toledo	628	207	246	29.40	30.08	+ .02	68.6	+ 4.7	89	11	78	46	30	59	32	61	57	70	1.33	— 1.0	7	8,714	sw.	40	ne.	30	18	8	4	3.3	
Detroit	730	183	193	29.30	30.08	+ .02	68.4	+ 5.5	90	18	78	45	30	59	28	61	57	72	1.85	— 0.6	5	6,727	sw.	32	ne.	30	16	7	7	3.8	
Upper Lake Region.							64.4	+ 5.1											78	3.42	— 0.1									4.3	
Alpena	609	13	92	29.41	30.08	+ .05	63.1	+ 5.9	93	9	74	36	30	53	33	57	54	80	4.09	+ 0.3	6	6,932	nw.	33	nw.	13	13	13	4	3.8	
Escanaba	612	40	82	29.41	30.07	+ .06	61.1	+ 4.4	86	8	69	37	30	53	24	57	54	80	3.49	— 0.1	10	6,836	s.	46	w.	11	13	10	7	4.4	
Grand Haven	632	54	92	29.38	30.05	+ .01	65.4	+ 4.5	87	18	76	43	30	55	33	59	56	79	3.84	+ 0.3	6	6,125	s.	27	w.	13	14	10	6	4.3	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, September, 1906*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Up. Lake Reg.—Con't.																													
Grand Rapids	707	121	162	29.31	30.07	+ .02	67.4	+ 4.5	94	18	79	43	30	56	33	59	55	71	3.19	— 0.2	8	5,976	w.	32	w.	21	13	7	10	4.4	
Houghton	668	66	74	29.32	30.04	+ .04	62.0	.....	93	10	71	38	30	53	40	.....	.....	.....	2.31	.....	9	4,727	w.	28	w.	26	15	10	5	4.0	
Marquette	734	77	116	29.26	30.06	+ .06	61.2	+ 4.4	92	8	70	42	24	53	30	56	53	80	3.16	— 0.7	8	7,541	nw.	45	nw.	13	13	9	8	4.8	
Port Huron	638	70	120	29.39	30.08	+ .02	66.1	+ 4.9	92	9	76	44	24	56	32	60	56	73	1.61	— 1.0	6	7,069	sw.	36	ne.	30	18	8	4	3.2	
Sault Ste. Marie	614	40	61	29.39	30.08	+ .06	60.2	+ 4.7	88	10	69	37	30	51	30	55	52	82	2.77	— 1.7	9	5,146	nw.	37	nw.	29	11	5	14	5.7	
Chicago	823	140	310	29.18	30.06	+ .02	70.1	+ 5.9	89	11	76	55	30	64	19	63	60	74	5.54	+ 2.7	7	9,384	se.	46	n.	29	14	8	8	4.3	
Milwaukee	681	122	142	29.34	30.08	+ .05	67.4	+ 6.2	90	11	74	51	30	61	20	62	59	82	4.08	+ 1.2	6	7,451	w.	32	ne.	30	15	10	5	4.0	
Green Bay	617	49	86	29.39	30.05	+ .03	65.6	+ 5.1	91	11	75	41	30	56	30	59	56	80	2.20	— 1.2	7	6,310	sw.	40	sw.	21	14	6	10	5.1	
Duluth	1,133	11	47	28.81	30.02	+ .04	61.0	+ 5.6	89	8	70	38	27	52	26	55	52	80	3.66	— 0.2	11	9,417	ne.	40	sw.	25	16	6	8	3.9	
North Dakota.							62.2	+ 6.5										70	1.16	— 0.2									4.4	
Moorhead	940	8	57	28.98	29.99	+ .03	63.3	+ 6.8	93	8	74	36	27	52	36	56	54	82	1.70	— 0.4	7	5,386	se.	34	se.	14	11	10	9	4.7	
Bismarck	1,674	15	57	28.22	29.99	+ .05	63.8	+ 6.8	102	7	78	34	29	50	46	53	47	65	0.60	— 0.6	5	7,069	se.	47	se.	27	17	7	6	3.8	
Devils Lake	1,482	11	44	28.39	29.95	+ .01	62.9	.....	103	7	79	29	29	47	45	52	47	67	0.99	.....	5	8,176	se.	38	se.	14	15	5	10	4.9	
Williston	1,875	14	44	27.95	29.91	— .02	61.4	+ 5.9	97	7	76	29	29	47	46	51	45	64	1.18	+ 0.4	8	6,075	sw.	50	w.	15	13	9	8	4.3	
Upper Miss. Valley.							63.1	+ 4.5										77	3.27	+ 0.7									4.6	
Minneapolis	.....	102	208	.....	.....	.....	65.4	+ 3.2	92	9	74	43	30	57	24	.....	.....	...	5.44	+ 2.9	10	8,144	se.	44	n.	12	10	9	11	5.1	
St. Paul	837	171	179	29.12	30.02	+ .03	65.0	+ 5.2	90	9	74	44	27	56	26	59	56	78	4.71	+ 1.7	10	6,194	se.	50	w.	25	9	12	9	5.6	
La Crosse	714	71	87	29.28	30.04	+ .03	66.6	+ 5.0	91	11	76	40	30	58	27	.....	.....	...	7.11	+ 2.9	11	4,601	s.	25	s.	10	15	7	8	4.7	
Madison	974	70	78	29.02	30.04	+ .01	66.6	+ 4.5	89	11	76	44	30	58	25	60	56	77	2.04	— 1.2	9	5,777	s.	38	ne.	29	13	7	10	4.5	
Charles City	1,015	8	58	28.97	30.04	+ .04	65.2	+ 1.1	89	10	76	36	30	54	33	60	58	87	3.24	0.0	12	4,026	s.	24	se.	15	11	6	13	5.5	
Davenport	606	71	79	29.38	30.03	.00	70.6	+ 5.9	92	17	81	46	30	60	29	62	58	71	2.47	— 0.7	6	4,669	e.	24	ne.	29	20	4	6	3.4	
Des Moines	861	84	101	29.13	30.03	+ .01	67.8	+ 3.7	92	9	78	43	30	58	29	61	57	76	3.24	0.0	9	4,993	sw.	28	ne.	29	9	12	9	5.6	
Dubuque	698	100	117	29.32	30.06	+ .03	68.6	+ 5.4	92	11	78	43	30	59	30	61	58	78	1.78	— 2.3	8	3,861	se.	25	n.	29	17	6	7	4.3	
Keokuk	614	64	77	29.37	30.03	.00	71.4	+ 5.0	93	17	82	47	30	61	27	62	59	74	2.94	— 0.6	4	4,578	se.	25	n.	29	19	6	5	3.5	
Cairo	356	87	93	29.62	29.99	— .06	74.8	+ 4.9	89	19	82	56	30	67	23	69	68	87	4.77	+ 2.2	10	4,873	ne.	33	e.	28	5	15	10	6.1	
La Salle	536	56	64	29.50	30.06	+ .02	69.0	.....	93	17	80	45	30	58	35	.....	.....	...	4.89	.....	6	4,174	ne.	24	ne.	29	17	6	7	3.8	
Peoria	609	11	45	29.38	30.05	+ .01	69.7	.....	93	11	82	47	27	58	35	61	58	74	4.92	.....	6	4,827	s.	30	ne.	29	15	10	5	3.8	
Springfield, Ill	644	10	92	29.34	30.02	— .03	71.9	+ 5.5	92	10	83	50	30	61	32	63	59	74	3.77	+ 0.6	6	5,205	ne.	25	ne.	30	13	9	8	4.4	
Hannibal	534	75	109	29.44	30.01	— .02	71.5	+ 4.8	92	17	82	49	30	62	30	.....	.....	...	5.72	+ 2.6	7	5,520	sw.	31	n.	29	14	10	6	4.5	
St. Louis	567	208	217	29.40	30.00	— .04	73.4	+ 4.0	91	16	82	52	30	65	27	66	62	75	4.40	+ 1.3	9	6,069	e.	39	ne.	29	14	6	10	4.4	
Missouri Valley.							67.9	+ 2.7										73	4.01	+ 1.5									4.5	
Columbia, Mo	784	11	84	29.18	29.99	— .04	71.6	+ 2.1	94	15	83	49	30	61	33	.....	.....	...	4.80	+ 1.5	7	5,057	se.	25	w.	2	16	6	8	3.9	
Kansas City	963	78	95	29.01	30.03	+ .01	72.3	+ 4.8	94	9	81	46	30	63	28	64	60	72	1.39	— 2.1	8	4,338	se.	28	nw.	29	14	10	6	4.1	
Springfield, Mo	1,324	98	104	28.61	30.00	— .03	71.8	+ 4.1	88	16	80	51	30	64	25	65	63	81	3.73	0.0	10	6,248	se.	30	n.	28	15	9	6	4.1	
Iola	984	40	47	28.98	30.00	— .01	72.3	.....	92	9	82	44	30	63	26	.....	.....	...	3.60	.....	7	4,651	s.	25	sw.	14	10	10	10	5.5	
Topeka	.....	85	89	.....	.....	.....	71.2	+ 2.5	93	8	81	44	30	61	31	.....	.....	...	1.31	— 2.0	10	5,269	s.	31	s.	14	14	10	6	3.6	
Lincoln	1,189	11	84	28.75	29.99	.00	68.2	+ 2.1	97	8	80	40	30	57	36	60	57	76	7.60	+ 5.6	10	6,411	s.	38	s.	11	14	8	8	4.6	
Omaha	1,105	115	121	28.85	30.02	+ .02	68.7	+ 3.9	95	8	78	42	30	59	28	60	56	72	4.84	+ 1.9	11	5,137	s.	33	n.	29	10	8	12	5.2	
Valentine	2,598	47	54	27.32	30.01	+ .05	62.9	+ 1.3	99	7	76	38	13	50	44	53	48	67	3.17	+ 2.2	9	7,411	s.	40	nw.	12	15	11	4	4.0	
Sioux City	1,135	96	164	28.80	30.00	+ .02	65.4	+ 0.2	94	9	76	35	30	55	31	.....	.....	...	8.06	+ 6.0	11	7,748	se.	48	w.	15	12	9	9	5.0	
Pierre	1,572	43	50	28.33	29.98	+ .03	66.4	+ 2.7	100	7	78	43	13	54	41	56	50	67	1.99	+ 1.0	8	4,728	se.	35	se.	14	16	6	8	4.1	
Huron	1,306	56	67	28.62	30.01	+ .05	63.2	+ 3.1	94	8	75	35	30	51	35	55	52	75	3.14	+ 1.7	8	7,578	se.	42	se.	24	13	10	7	4.6	
Yankton	1,233	49	57	28.69	29.99	+ .01	65.0	+ 2.9	96	10	76	37	30	54	37	.....	.....	...	4.03	+ 1.2	9	4,656	nw.	32	sw.	25	14	5	11	5.0	
Northern Slope.							60.7	+ 2.6										63	1.57	+ 0.6									3.8	
Havre	2,505	11	44	27.31	29.92	— .02	59.5	+ 4.6	92	7	74	28	26	45	44	50	44	63	0.93	— 0.2	3	5,739	w.	31	w.	24	16	12	2	3.7	
Miles City	2,371	26	48	27.46	29.98	+ .08	65.4	+ 5.4	99	7	81	35	26	50	47	53	46	60	0.81	+ 0.1	4	3,469	s.	32	n.	9	22	6	2	2.2	
Helena	4,110	8	56	25.83	29.99	+ .02	58.0	+ 2.2	88	6	71	31	12	45	35	47	38	55	1.29	+ 0.1	3	4,699	sw.	34	sw.	9	15	9	6	3.9	
Kalispell	2,962	8	34	26.92	29.96	.00	56.0	.....	86	6	71	29	26	41	42	46	39	63	0.23	.....	7	3,488	w.	20	sw.	23	15	6	9	4.2	
Rapid City	3,234	46	50	26.62	30.00	+ .04	63.4	+ 2.0	93	7	75	40	29	52	34	53	46	62	1.16	+ 0.6	5	3,749	nw.	26	s.	27	20	4	6	2.8	
Cheyenne	6,088	56	64	24.10	30.01	+ .05	57.6	+ 0.8	85	7	70	33	16	44	38	47	42	68	1.86	+ 1.0	10	6,278	nw.	46	w.	14	13	8	9	4.7	T.
Lander	5,372	26	36	24.71	30.01	+ .05	57.3	+ 1.5	85	6	74	30	15	41	43	47	40	61	0.67	— 0.2	3	1,992	sw.	18	nw.	1	16	12	2	3.3	
Yellowstone Park	6,200	11	48	23.95	30.01	+ .04	53.0	.....	77	6	68	27	26	38	45	42	34	59	0.62	.....	6	5,249	s.	32	sw.	7	16	9	5	3.5	0.4
North Platte	2,821	11	51	27.13	30.04	+ .07	64.0	+ 1.6	97	7	78	38	30	50	40	55	51	73	4.25	+ 3.0	11	5,198	se.	31	ne.	15	15	10	5	3.2	
Middle Slope.							68.0	+ 0.3										72	4.28	+ 2.5									4.3	
Denver	5,291	129	136	24.82	30.02	+ .06	62.1	+ 0.2	89	7	75	41	16	50	38	51	45	62	2.72	+ 1.9	8	4,911	s.	33	n.	19	14	8	8	4.7	
Pueblo	4,685	80	86	25.33	29.99	+ .03	64.2	— 1.0	90	9	77	44	30	51	38	52	44	59	1.68	+ 1.3	6	4,526	se.	39	w.	22	20	7	3	2.9	
Concordia	1,398	42	47	28.57	30.02	+ .03	69.4	+ 1.6	96	8	81	40	30	58	37	60	56	72	3.75	+ 1.3	7	4,340	s.	24	s.	14	13	13	4	4.1	
Dodge	2,509	44	54	27.45	30.01	+ .03	67.7	+ 0.1	90	9	79	40	30	56	34	60	57	79	9.26	+ 7.9	8	5,893	s.	38	s.	14	9	18	3	4.6	
Wichita	1,358	78	86	28.61	30.02	+ .02	71.4	+ 1.4	91	9	82	45	30	61	29	64	61	77	4.33	+ 1.4	11	4,961	s.	27	s.	14	6	16	8	5.2	
Oklahoma	1,214	10	47	28.71	29.97	— .02	73.2	— 0.6	89	9	83	46	30	63	27	65	63	80	3.93	+ 1.3	9	8,356	s.	44	s.	14	14	6	10	4.4	
Southern Slope.							71.3	+ 0.7										74	1.76	— 0.7									4.4	
Abilene	1,738	45	54	28.20	29.97	+ .01	74.2	— 0.4	91	12	84	51	30	65	28	66	64	79	2.85	+ 0.4	7	4,570	s.	27	s.	14	4	18	8	6.1	
Amarillo	3,676	10	49	26.31	29.98	+ .02	69.0	+ 1.6	88	10	80	45	30	58	27	60	57	76	1.96	— 0.6	8	7,659	se.	31	n.	21	21	8	1	2.3	
Del Rio	944	8	57	28.95	29.91	— .03	77.5	.....	96	18	88	53	30	67	34	.....	.....	...	5.59	.....	13	4,508	se.	32	w.	1	9	14	7	5.3	
Roswell	3,578	9	57	26.34	29.91	— .01	70.8	+ 0.8	94	12	86	48	30	56	43	59	54	68	0.48	— 1.8	9	3,577	se.	27	nw.	21	13	14	3	3.9	
Southern Plateau.							70.4	— 0.7										45	0.76	— 0.2									1.9	
El Paso	3,762	10	110	26.19	29.88	.00	74.1	+ 1.0	94	9	88	55	24	60	37	58	50	54	1.18	+ 0.1	6	6,218	e.	39	ne.	3	23	7	0	1.8	
Santa Fe	7,013	33	39	23.35	29.93	.00	60.2	+ 0.3	79	8	72	39	18	48	33	47	38	52	1.71	+ 0.2	9	4,637	ne.	30	e.	26	19	11	0	2.8	
Flagstaff	6,907	12	44	23.43	29.92	+ .03	54.9	— 2.6	78	6	70	28	16	40	41	44	37	59	1.67	— 0.4	5	4,905	sw.	33	sw.	13	19	8	3	3.0	
Phoenix	1,108	50	56	28.69	29.81	.00	81.7	+ 0.3	104	23	97	56	16	66	40	59	42	30	T.	— 0.6	0	3,246	e.	24	nw.	7	24	5	1	1.6	
Yuma	141	16	46	29.65	29.79	+ .01	83.0	— 1.7	106	29	99	59	25	67	43	64	51	41	T.	— 0.2	0	3,513	s.	22	w.	15	29	1	0	0.3	
Independence	3,910	11	42	25.98	29.92	+ .06	68.4	— 1.6	90	3	84	45	14	53	38	51	34	32	0.00	— 0.1	0	5,252	nw.	34	se.	23	25	4	1	1.7	
Middle Plateau.							60.9	— 0.9										45	1.20	+ 0.4									3.0	
Reno	4,532	56	63	25.50	29.94	— .01	61.0	+ 1.0	86	22	78	35	16	44	45	48	37	51	0.20	+ 0.1	3	3,714	w.	28	w.	23	24	5	1	1.4	
Tonopah	6,089	12	20	24.12	29.97	.....	63.2	.....	80	20	74	35	15	53	31	46	29	31	0.08	.....	2	6,901	se.	48	nw.	23	22	7	1	2.3	
Winnemucca	4,344	18	56	23.64	30.00	+ .07	59.5	— 0.6	88	3	79	29	16	40	50	44	32	45	0.44	+ 0.1	3	3,465	ne.	37	nw.	12	22	2	6	2.8	
Modena	5,479	10	43	24.66	29.95	+ .03	58.8	— 1.1	82	6	75	34	14	43	40	46	36	50	0.91	+ 0.5	5	6,488	w.	48	n.	1	21	8	1	2.9	
Salt Lake City	4,366	105	110	25.65	29.96	+ .01	63.8	— 0.5	88	6	75	43	17	52	32	51	42	48	1.49	+ 0.6	4	3,877	se.	22	ne.	15	18	6	6	3.5	
Durango	6,546	18	56	23.74	29.96	+ .03	57.4	— 2.0	85	7	72	31	17	42	39	46	39	61	2.73	+ 0.9	13	3,911	nw.	27	sw.	13	13	11	6	4.2	
Grand Junction	4,608	43	51	25.42	29.97	+ .02	64.9	— 2.3	91	6	78	43	18	52	34	52	43	53	1.43	+ 0.5	7	3,086	nw.	28	sw.	24	19	5	6	3.7	
Northern Plateau.							63.1	+ 2.8										46	0.54	— 0.3									3.4	
Baker City	3,471	48	58	26.46	30.02	+ .03	58.8	+ 3.0	87	6	74	32	11	44	39	46	34	47	0.63	— 0.1	5	4,855	s.	23	s.	7	20	5	5	2.8	
Boise	2,739	78	86	27.16	29.98	+ .01	64.4	+ 3.6	93	6	79	28	11	50	40	50	36	40	0.32	— 0.1	2	3,812	nw.	25	nw.	23	21	7	2	2.4	
Lewiston	757	10	51	29.18	29.98	.00	65.6	+ 2.6	97	19	80	39	26	51	42	.....	.....	...	0.57	— 0.5	7	3,214	e.	42	nw.	23	12	13	5	4.3	
Pocatello	4,477	46	54	25.52	29.99	+ .03	62.0	+ 1.5	88	6	75	34	11	49	39	47	34	42	0.48	— 0.2	3	6,263	se.	26	nw.	15	21	8	1	2.3	
Spokane	1,929	101	110	27.95	29.98	.00	61.0	+ 2.9	92	19	74	36	26	48	40	49	38	50	0.62	— 0.4	5	4,381	sw.	31	sw.	24	12	10	8	5.0	
Walla Walla	1,000	71	79	28.92	29.98	— .02	66.9	+ 3.0	96	18	79	42	26	55	32	56	47	51	0.62	— 0.3	4	3,730	s.	22	sw.	24	18	8	4	3.8	
N. Pac. Coast Reg.							57.7	+ 0.6										76	4.31	+ 1.4									6.2	
North Head	211	11	56	29.81	30.03	.00	56.5	— 0.5	68	28	60	48	28	53	20	54	52	87	5.17	+ 1.5	14	12,384	nw.	74	se.	7	7	10	13	6.2	
Port Crescent	259	12	29	29.75	30.03	+ .01	51.8	— 1.0	65	19	58	36	28	45	21	.....	.....	...	4.98	+ 1.5	14	3,167	nw.	16	sw.	8	4	11	15	7.0	
Seattle	123	185	224	29.91	30.04	+ .03	58.9	+ 0.5	73	30	66	44	11	52	25	54	50	75	3.31	+ 1.5	14	5,517	se.	36	s.	23	8	16	6	5.7	
Tacoma	213	113	120	29.79	30.02	.00	58.6	+ 2.4	79	18	67	43	11	50	27	.....	.....	...	4.11	+ 1.9	13	3,744	n.	26	sw.	6	7	13	10	5.9	
Tatoosh Island	86	7	57	29.90	30.00	— .01	54.4	+ 0.6	62	14	58	46	28	50	14	53	51	89	9.33	+ 2.8	16	9,055	e.	58	s.	5	3	5	22	7.9	
Portland, Oreg.	153	68	96	29.86	30.02	— .01	61.8	+ 1.1	84	18	72	41	28	52	32	55	51	70	2.20	+ 0.4	9	3,522	nw.	26	sw.	24	8	13	9	5.5	
Roseburg	510	9	57	29.48	30.03	+ .01	62.0	+ 1.1	93	18	75	38	11	49	42	55	50	71	1.10	0.0	5	1,911	n.	16	n.	10	9	11	10	5.3	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, September, 1906*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.								Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.			Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Mid. Pac. Coast Reg.							63.0	+ 0.1									62	0.36	— 0.4										3.1
Eureka	62	62	80	29.99	30.06	+ .05	56.1	+ 1.7	72	17	61	46	11	51	19	53	51	84	0.76	— 0.6	3	4,065	n.	42	n.	15	7	14	9	5.5
Mount Tamalpais	2,375	11	18	27.54	29.98	+ .04	66.4	.....	85	18	74	47	14	59	22	52	39	43	0.08	.....	1	9,967	nw.	70	nw.	12	25	5	0	1.1
Point Reyes Light	490	7	18	29.42	29.94	.....	55.6	— 1.0	79	16	60	47	29	51	25	....	....	....	0.05	— 0.9	1	16,959	n.	74	nw.	13	13	7	10	5.0
Red Bluff	332	50	56	29.56	29.90	— .03	73.6	— 0.2	99	5	88	52	22	59	39	58	46	46	0.61	— 0.1	4	3,825	nw.	40	n.	14	21	6	3	2.0
Sacramento	69	106	117	29.84	29.91	+ .02	69.8	+ 0.3	97	19	84	49	21	55	37	58	50	57	0.20	— 0.2	2	5,261	s.	27	nw.	24	26	3	1	1.1
San Francisco	287	29	42	29.81	29.98	+ .04	60.0	— 0.4	82	16	67	48	30	53	23	55	52	82	0.18	— 0.1	3	5,126	w.	29	w.	30	16	11	3	3.3
San Jose	141	78	88	29.80	29.95	.....	64.4	.....	93	18	80	43	22	49	42	....	....	....	0.13	.....	2	.....	nw.	....	.....	....	26	2	2	1.8
Southeast Farallon	30	9	17	29.95	29.98	.....	55.9	.....	73	16	58	50	30	53	13	....	....	....	0.15	.....	1	12,520	nw.	49	nw.	24	14	5	11	4.7
S. Pac. Coast Reg.							69.2	+ 0.8									65	0.05	0.0										2.0
Fresno	330	67	70	29.55	29.90	+ .03	74.0	— 0.5	99	7	91	50	24	58	42	58	45	44	T.	— 0.2	0	3,921	nw.	32	nw.	23	27	3	0	0.7
Los Angeles	338	116	123	29.55	29.91	+ .03	69.8	+ 1.3	105	30	81	50	23	58	35	59	54	69	0.05	0.0	1	3,616	w.	22	sw.	18	19	8	3	2.7
San Diego	87	94	102	29.80	29.89	.00	68.2	+ 1.2	91	30	75	58	12	62	27	61	58	76	0.12	+ 0.1	1	4,210	nw.	21	nw.	30	27	3	0	2.2
San Luis Obispo	201	47	54	29.74	29.96	+ .03	64.6	+ 1.2	100	18	79	43	14	51	42	55	49	70	0.04	— 0.1	1	2,929	nw.	18	w.	14	25	5	0	2.5
West Indies.																														
Grand Turk	11	6	20	29.92	29.93	— .02	82.6	.....	93	10	89	72	*	76	....	....	....	....	1.99	.....	13	.....	se.	....	.....	....	....	....	....	....	....
San Juan	82	48	90	29.81	29.89	— .05	80.6	— 0.4	94	13	86	73	23	75	19	75	73	79	5.53	+ 0.4	15	7,356	se.	35	w.	3	9	10	11	5.9
Panama.																														
Ancon	74	....	....	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	.....	.....	....	.....	....	.....	.....	....	....	....	....	....
Naos	40	....	....	.....	.....	.....	.....	.....	....	....	....	....	....	....	....	....	....	....	.....	.....	....	.....	....	.....	.....	....	....	....	....	....

*More than one date.

TABLE II.—*Climatological record of cooperative observers, September, 1906.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alaga	....	....	....	10.46	
Ashville	90	62	75.6	13.90	
Auburn	88	66	76.5	5.92	
Benton	....	....	....	9.42	
Bermuda	96	63	78.8	13.37	
Boligee	99	70	82.8	6.21	
Bridgeport	....	....	....	5.98	
Burkeville	....	....	....	6.85	
Calera	....	....	....	12.75	
Camphill	97	64	78.5	.....	
Cedar Bluff	....	....	....	8.11	
Citronelle	96	65	78.7	12.46	
Clanton	95	63	78.0	10.33	
Cordova	94	61	77.9	4.72	
Dadeville	....	....	....	6.66	
Daphne	96	65	80.1	14.75	
Decatur	96	61	78.2	4.95	
Demopolis	....	....	....	8.69	
Eufaula	90	66	77.2	6.10	
Flomaton	98	64	81.0	6.55	
Florence	95	59	77.4	5.51	
Fort Deposit	98	59	76.8	7.93	
Gadsden	96	65	78.4	5.13	
Goodwater	96	64	78.9	12.11	
Greensboro	94	59	79.6	6.87	
Greenville	....	....	....	12.90	
Guntersville	....	....	....	9.59	
Hamilton	95	58	77.3	7.56	
Highland Home	97	65	79.0	10.12	
Livingston	97	60	78.6	7.78	
Lock No. 4	92	64	77.5	8.11	
Lucy	95	61	79.2	9.82	
Madison Station	95	59	78.2	12.48	
Maplegrove	95	61	77.1	8.99	
Marion	98	67	80.8	5.45	
Milstead	....	....	....	7.92	
Newbern	100	64	80.6	6.49	
Notasulga	....	....	....	7.34	
Oneonta	94	62	75.8	9.81	
Opelika	93	63	78.2	7.11	
Ozark	96	64	79.2	10.42	
Prattville	98	65	78.8	9.54	
Pushmataha	95	64	79.4	7.84	
Riverton	92	59	76.0	7.12	
Scottsboro	97	61	75.8	9.37	
Selma	98	66	80.3	3.70	
Spring Hill(*)	90	70	78.0	.....	
Talladega	93	64	78.4	10.79	
Tallassee	....	....	....	6.37	
Thomasville	93	64	78.4	6.31	
Tuscaloosa	96	65	79.4	6.69	
Tuscumbia	90	63	77.2	4.11	
Tuskegee	97	66	80.2	5.57	
Union Springs	95	67	79.6	4.53	
Uniontown	96	63	79.8	8.96	
Valleyhead	94	58	75.0	5.67	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama—Cont'd.	°	°	°	*Ins.*	*Ins.*
Vienna	....	....	....	6.36	
Wetumpka	99	65	79.8	8.39	
Alaska.					
Fort Egbert	....	30	.....	0.01	
Juneau	68	34	51.2	3.68	
Killisnoo	60	35	47.9	4.70	
Sitka	66	33	50.7	5.78	
St. Michael	65	27	48.0	.....	
Teikhill	66	17	42.0	0.62	
Wortmans	87	20	50.0	.....	
Arizona.					
Allaire Ranch	....	....	....	0.04	
Arizona Canal Co. Dam	106	54	82.9	T.	
Aztec	112	60	85.0	T.	
Benson	98	45	73.8	T.	
Bisbee	86	51	69.3	0.74	
Blue	87	40	62.7	2.07	
Bonita	....	....	....	0.30	
Bowie	97	40	73.4	0.00	
Buckeye	106	41	78.0	T.	
Casagrande	111	57	86.9	0.00	
Chlarsons Mill	66	35	49.4	0.86	
Clifton	....	....	....	0.32	
Cline	99	48	75.3	0.14	
Cochise[1]	95	60	80.0	0.10	
Columbia	104	50	81.5	T.	
Congress	95	52	78.8	0.08	
Douglas	97	48	74.2	0.89	
Dudleyville	96	49	75.1	0.03	
Duncan	99	44	69.8	0.04	
Fish Creek	....	....	....	T.	
Flagstaff	73	28	53.9	1.52	
Fort Apache	88	46[e]	68.4[f]	2.53	
Fort Huachuca	91	40	71.6	0.54	
Fort Mohave	108	58	83.4	0.00	
Fredonia	91	35	63.4	0.70	
Gilabend	107	59	84.6	0.00	
Grand Canyon	85	22	58.2	2.06	
Greaterville	90	47	70.0	0.00	
Greer	....	....	....	1.60	
Holbrook	96	36	66.3	0.34	
Huachuca Res	....	....	....	0.10	
Jerome	89	46	71.4	T.	
Keams Canyon	86	32	60.2	0.83	
Livingston	....	....	....	0.08	
Maricopa	108	50	82.8	0.00	
Mesa	108	53	81.3	T	
Mohawk Summit[1]	106	74	86.2	0.00	
Nutrioso	....	....	....	1.82	
Oracle	89	54	73.6	0.02	
Parker	110	50	81.6	0.00	
Phoenix (Ex. Farm)	104	50	79.7	T.	
Picacho[5]	104	70	89.2	0.00	
Pinal Ranch	....	....	....	0.59	
Pinto	....	....	....	0.97	
Prescott	89	32	61.5	0.07	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
Quakingasp	76	23	50.4	0.91	
Roosevelt	103	48	76.0	T.	
St. Johns	89	32	62.4	1.28	
St. Michaels	84	33	58.4	1.70	
San Carlos	100	46	76.4	0.20	
San Simon	96	47	74.7	T.	
Seligman	86	33	64.8	0.18	
Sentinel[1]	108	66	84.6	T.	
Show Low	....	....	....	0.88	
Signal	100	56	81.4	0.00	
Silver Bell	99	60	83.0	0.00	
Tempe	108	50	80.0	0.00	
Thatcher	100	43	74.0	0.03	
Tombstone	90	51	71.5	0.60	
Tuba	91	39	66.4	1.37	
Tucson	102	52	79.1	0.43	
Upper San Pedro	95	43	72.3	0.50	
Vail[1]	106	60	77.8	0.13	
Walnut Grove	....	....	....	T.	
Willcox	94	45	70.0	T.	
Yarnell	....	....	....	0.85	
Young	....	....	....	0.37	
Arkansas.					
Alicia	90	56	74.7	10.22	
Amity	93	57	75.8	4.16	
Arkadelphia	95	59	77.0	2.70	
Arkansas City	....	....	....	8.26	
Arnett	87	52	70.6	4.72	
Batesville	95	55	76.4	7.80	
Beebranch	96	51	74.0	3.40	
Black Rock	....	....	....	7.48	
Boonville	94	55	75.4	4.00	
Brinkley	98	58	77.8	9.85	
Calico Rock	....	....	....	6.24	
Camden	93	59	77.2	3.12	
Center Point	96	57	78.4	5.02	
Clarendon	....	....	....	10.25	
Conway	93	55	75.2	5.61	
Cornerstone	98	55	77.5	9.02	
Corning	94	55	74.8	8.95	
Dardanelle	....	....	....	5.16	
Dodd City	92	54	73.0	7.30	
Dutton	86	51	70.0	5.43	
Eldorado	97	61	78.1	4.24	
Eureka Springs	93	53	72.8	5.84	
Fayetteville	93	50	73.8	4.20	
Forrest City	94	59	76.6	9.54	
Fulton	....	....	....	3.00	
Hardy	91	53	73.8	7.18	
Harrison	92	47	71.4	6.84	
Heber	100	56	76.8	7.89	
Helena	96	63	77.9	8.65	
Hope	99	61	78.8	4.01	
Hot Springs	92	56	75.0	6.25	
Huntsville	....	....	....	4.32	
Jonesboro	100	52	77.2	12.27	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arkansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Junction	98	57	77.4	2.33	
La Crosse	94	54	74.6	.....	
Lewisville	97	56	78.2	6.10	
Lutherville	93	51	74.2	4.60	
Luxora	.....	.....	.....	7.55	
Malvern	94	58	75.7	4.80	
Mammoth Springs	92	.....	.....	5.51	
Marked Tree	.....	.....	.....	5.95	
Marvell	95	58	77.2	9.58	
Mena	91	55	74.4	4.09	
Montrose	97	60	77.8	8.62	
Mossville	88	53	70.5	5.76	
Mt. Home	92[z]	54[z]	72.2[z]	6.99	
Newport	99	56	77.1	6.61	
Ozark	93	53	75.7	2.74	
Pinebluff	96	58	77.8	4.84	
Pocahontas	96	54	76.0	8.36	
Pond	90	50	72.2	3.79	
Prescott	98	61	78.8	4.62	
Princeton	97	56	79.4	4.46	
Rison	97[f]	55[f]	76.6[f]	5.57	
Rogers	90	52	72.5	4.04	
Russellville	92	56	74.8	5.30	
Spielerville	93	56	75.7	3.21	
Stuttgart	94	56	76.8	8.61	
Texarkana	98	62	79.9	.....	
Warren	99	58	78.0	10.19	
White Cliffs	.....	.....	.....	5.24	
Wiggs	96	53	75.4	3.15	
Winchester	.....	.....	.....	7.19	
Witts Springs	99	56	72.2	10.18	
California.					
Alturas	90	27	57.6	0.60	
Auburn	87	54	70.4	0.25	
Azusa	106	46	70.6	T.	
Bagdad	102	65	84.9	0.00	
Bakersfield	101	50	73.8	0.00	
Bear Valley	.....	.....	.....	0.49	
Berkeley	83	50	62.8	0.17	
Bishop	89	37	64.0	0.00	
Blocksburg	93	40	63.8	0.55	
Blue Canyon	81	35	59.2	0.50	
Bodie	76	17	46.8	0.78	2.0
Branscomb	89	38	61.6	0.88	
Brush Creek	90	36	63.2	0.43	
Butte Valley	.....	.....	.....	0.51	
Calexico	102	58	82.2	0.00	
Campbell	92	39	62.9	0.20	
Campo	.....	.....	.....	0.90	
Chico	98	43	71.2	0.31	
Claremont	107	49	73.5	0.04	
Cloverdale	99	40	68.9	0.06	
Colfax	94	34	65.8	0.20	
Colusa	92	52	70.2	0.26	
Craftonville	.....	.....	.....	0.83	
Crescent City	82	40	56.3	2.13	
Crockers	.....	.....	.....	T.	
Cuyamaca	74	39	57.9	0.90	
Delta	99	50	73.4	0.04	
Diamond	.....	.....	.....	0.26	
Dobbins	98	56	74.0	0.48	
Drytown	.....	.....	.....	0.40	
Durham	99	45	71.0	0.28	
Elcajon	102	47	72.0	0.30	
Electra	98	50	73.6	0.23	
Elmwood	108[f]	45	72.4[e]	0.00	
Elsinore	102	40	73.8	0.17	
Emigrant Gap	80	36	64.0	1.00	
Escondido	111	42	69.2	0.19	
Folsom	103	48	74.6	0.99	
Fordyce	.....	.....	.....	0.90	
Fort Bragg	.....	.....	.....	0.18	
Fort Ross	72	40	56.6	0.38	
Georgetown	90	40	68.2	0.87	
Gilroy (near)	102	40	65.8	0.19	
Gold Run	93	43	69.2	0.43	
Grass Valley	.....	.....	.....	0.48	
Greenville	92	30	60.0	0.44	
Hanford	99	40	71.4	0.00	
Healdsburg	104	37	70.2	0.11	
Heber	108	56	83.2	0.00	
Helen Mine	89	40	68.0	0.12	
Hollister	101	40	64.8	0.16	
Indio	109	58	85.6	0.04	
Idylwild	87	34	61.3	0.14	
Iowa Hill	91	42	68.2	0.39	
Isabella	.....	.....	.....	0.14	
Jamestown	95	43	69.2	0.20	
Kennedy Gold Mine	.....	.....	.....	0.37	
Kentfield	.....	.....	.....	0.04	
Kernville	.....	.....	.....	0.00	
King City	104	41	68.0	0.00	
Laporte	77	38	57.0	0.43	
Legrande	102	45	73.8	T.	
Lemoncove	102	46	75.7	T.	
Lick Observatory	82	42	63.4	0.28	
Livermore	101	41	68.4	0.20	
Lodi	92	45	66.6	0.14	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Lone Pine	90	41	65.0	0.00	
Los Gatos	91	46	65.8	0.25	
Magalia	87	34	64.0	0.62	
Mammoth	113	52	84.4	0.00	
Marysville	98	46	71.6	0.21	
Mecca	107[d]	61[d]	83.4[d]	0.00	
Merced	102	47	73.2	0.00	
Mercury	.....	.....	.....	0.09	
Mills College	.....	.....	.....	0.26	
Milo	.....	.....	.....	0.10	
Milton (near)	85	49	73.0	0.00	
Mohave	97	55	76.6	0.00	
Mokelumne Hill	94	46	70.8	0.34	
Mono Ranch	89	41	63.6	0.00	
Montague	92	37	63.6	0.43	
Monterio	92	46	70.7	0.00	
Monumental	91	38	59.2	3.82	
Mount St. Helena	.....	.....	.....	0.15	
Napa	97	49	68.8	0.14	
Needles	99	54	78.4	0.00	
Nellie	.....	.....	.....	0.66	
Nevada City	92	36	63.8	0.43	
Newcastle	96	46	72.0	0.41	
Newman	100[z]	49[z]	74.1[z]	0.04	
Niles	94	44	65.4	0.31	
Nimshew	89	45	70.7	0.62	
North Bloomfield	91	37	65.0	0.24	
Oakland	84	50	63.2	0.21	
Ojai Valley	106	45	70.0	T.	
Orleans	103	45	71.1	1.28	
Oroville (near)	98	49	73.6	0.25	
Palermo	100	46	71.2	0.36	
Peachland	96	39	64.8	0.07	
Pilot Creek	.....	.....	.....	0.84	
Pine Crest	98	49	68.3	0.00	
Placerville	88	38	63.6	0.00	
Point Lobos	77	52	61.4	0.02	
Porterville	100	49	74.0	0.00	
Poway	107	44	71.3	0.36	
Quincy	84	32	57.0	0.47	
Redding	94	50	72.4	1.01	
Redlands	104	49	72.8	0.19	
Reedley	100	49	73.8	T.	
Represa	.....	.....	.....	0.92	
Rialto	103	50	75.4	0.25	
Riovista	94	52	70.4	0.21	
Riverside	103	44	69.8	0.02	
Rocklin	97	49	71.6	T.	
Sacramento	88	48	66.0	0.20	
Salinas	94	44	62.4	0.14	
Salton	100	70	85.9	0.00	
San Bernardino	106	45	72.0	0.05	
San Jacinto	104	47	73.6	0.12	
San Leandro	93	44	63.8	0.12	
San Miguel Island	.....	.....	.....	0.35	
Santa Barbara	98	50	67.3	0.00	
Santa Clara College	95	40	65.1	0.38	
Santa Cruz	98	42	63.6	0.30	
Santa Maria	97	44	63.8	0.01	
Santa Monica	93	45	63.2	0.00	
Santa Rosa	96	39	65.6	0.16	
Shasta	102	48	74.7	0.76	
Sierra Madre	102	48	71.6	0.03	
Sisson	92	35	60.2	0.39	
Sonora	92	42	65.2	0.16	
Sterling	87	38	62.7	0.16	
Stockton	91	49	68.4	0.10	
Storey	100	43	69.8	0.00	
Summerdale	82	36	61.2	0.19	
Summit	78	34	62.4	0.32	
Susanville	82	33	58.0	0.28	
Tamarack	81	25	52.2	1.10	2.5
Tejon	92	51	73.0	0.00	
Towle	89	37	63.1	0.45	
Truckee	80	36	59.4	0.34	
Tulare	96	44	69.2	0.00	
Tustin (near)	.....	.....	.....	0.01	
Ukiah	101	36	66.6	0.09	
Upland	93	50	70.2	T.	
Upperlake	98	43	69.0	0.03	
Upper Mattole	.....	.....	.....	0.83	
Vacaville	100	44	69.4	0.26	
Visalia	103	47	73.4	0.00	
Wasco	102	48	72.9	0.00	
Wheatland	93	49	69.6	0.27	
Willets	92	40	63.0	0.00	
Woodleaf	.....	.....	.....	3.90	
Woodside	91	44	64.7	0.20	
Yosemite	89	33	63.2	0.04	
Yerka	.....	.....	.....	0.77	
Zenia	89	40	61.4	1.43	
Colorado.					
Akron	.....	.....	.....	1.00	
Antelope Springs	74	19	45.6	4.24	3.0
Arriba	86	39	58.6	3.99	
Ashcroft	74	22	47.6	3.36	T.
Blaine	92	35	65.2	2.40	
Boulder	85	40	62.1	3.13	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Buena Vista	78	31	54.3	3.01	
Breckenridge	71	26	46.6	2.90	
Burlington	96	37	64.8	2.27	
Canyon	89	43	65.1	2.35	
Calham	84	31	60.8	2.52	
Cardinal	77[f]	31[e]	53.2[f]	1.81	
Castlerock	90	31	50.0	2.34	
Cheesman	84	35	58.0	2.60	
Cheyenne Wells	90	38	63.6	2.36	
Chromo	.....	.....	.....	2.78	
Clearview	71	28	48.0	1.63	
Collbran	87	35	58.9	2.92	
Colorado Springs	83	36	58.8	1.94	
Cope	94	39	63.6	1.44	
Cripplecreek	.....	.....	.....	3.80	T.
Delta	94	38	63.0	1.60	
Dunkley	78	28	50.9	1.84	2.0
Eagle	83	29	55.2	2.07	
Fort Collins	87	37	58.6	3.08	
Fort Morgan	92	38	62.6	0.79	
Fowler	.....	.....	.....	2.02	
Frances	75	31	51.3	3.80	5.0
Fruita	92	39	63.2	2.25	
Garnett	82	23	54.0	1.45	
Gleneyre	84	34	58.0	2.62	
Glenwood Springs	83	31	56.8	1.90	
Gathic	72	19	45.4	3.80	8.0
Grand Valley	93	36	62.0	2.45	
Grover	.....	.....	.....	1.38	
Gunnison	83	25	52.4	2.17	
Hahns Peak	75	23	48.2	1.98	1.8
Hamps	84	36	58.2	2.23	
Higbee	.....	.....	.....	3.92	
Hoehne	93	33	60.8	2.17	
Holly	95	42	68.5	3.65	
Holyoke (near)	98	37	64.6	1.23	
Idaho Springs	79	32	54.4	3.58	
Lake City	78	29	51.8	2.66	T.
Lake Moraine	65	27	45.6	3.78	T.
Lamar	93	38	67.7	3.04	
Laporte	.....	.....	.....	2.24	
Las Animas	95	40	66.2	2.37	
Lay	85	30	55.1	1.91	
Leroy	93	39	62.8	2.70	
Longs Peak	73	26	47.2	3.21	
Lujane	85	34	59.7	2.40	
Manassa	79	28	53.6	.....	
Mancos	84	29	55.8	3.52	
Meeker	85[f]	30	56.4[d]	2.98	
Montrose	91[e]	33[e]	57.5[e]	1.49	
Pagoda	84	27	54.4	2.72	
Paonia	89	40	61.7	2.67	
Platte Canyon	.....	.....	.....	2.83	
Rangely	84	29	57.4	2.28	
River Portal	87	36	58.2	2.06	
Rockyford	90	41	64.7	1.64	
Saguache	82	34	57.2	.....	
Salida	83	29	56.2	2.37	
San Luis	80	31	54.6	1.99	
Santa Clara	81	35	55.0	.....	
Sapinero	82	28	51.6	1.98	T.
Sheridan Lake	92	37	66.7	2.06	
Silt	86	38	59.8	2.11	
Silverton	72	19	46.2	3.98	9.8
Stonewall	.....	.....	.....	2.37	
Sugar City	.....	.....	.....	4.13	
Trinidad	88	38	61.8	1.77	
Victor	74	28	52.5	3.52	2.3
Vilas	.....	.....	.....	1.57	
Wagon Wheel	78	22	47.5	2.00	
Waterdale	88	34	60.0	2.83	
Westcliffe	80	28	53.4	3.23	
Whitepine	69	24	46.4	3.05	
Wray	97	37	65.2	1.71	
Yuma	.....	.....	.....	1.19	
Connecticut.					
Bridgeport	92	43	67.5	3.97	
Canton	88	34	62.8	3.01	
Colchester	89[e]	36[e]	64.5[e]	2.95	
Falls Village	.....	.....	.....	3.18	
Hawleyville	91	36	64.4	2.96	
Lake Konomoc	.....	.....	.....	3.18	
New London	87	43	66.6	3.17	
North Grosvenor Dale	91	34	63.4	2.04	
Norwalk	89	38	64.6	3.02	
Southington	88	36	64.8	2.35	
South Manchester	.....	.....	.....	2.74	
Storrs	87	37	63.6	2.65	
Voluntown	92[e]	32[e]	64.6[e]	2.19	
Wallingford	.....	.....	.....	3.92	
Waterbury	95	36	67.0	1.92	
West Cornwall	89	37	63.4	3.58	
West Simsbury	.....	.....	.....	3.29	
Delaware.					
Delaware City	.....	.....	.....	1.36	
Dover	91	52[e]	71.8[e]	2.09	
Milford	96	51	73.6	0.92	
Millsboro	98	51	74.5	1.38	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Delaware—Cont'd.	°	°	°	*Ins.*	*Ins.*
Newark	87	47	70.2	1.02	
Seaford	91	51	70.8	2.28	
District of Columbia.					
West Washington	94	48	72.6	0.63	
Florida.					
Apalachicola	91	70	80.5	17.95	
Avon Park	94	68	81.1	1.28	
Bartow	95	67	81.2	3.51	
Bonifay	94	68	80.5	.....	
Brooksville	97	68	81.8	6.61	
Clermont	99	69	82.7	2.19	
De Funiak	95	67	79.7	17.41	
Deland	95	67	80.8	.....	
Eustis	94	67	80.8	3.01	
Federal Point	95	67	80.0	2.88	
Fenholloway	95	68	80.8	.....	
Fernandina	95	68	80.8	4.95	
Flamingo	97	71	82.3	.....	
Fort Myers	91	70	80.6	3.39	
Fort Pierce	90	69	79.6	2.61	
Gainesville	96	69	81.8	2.29	
Galt	94	69	81.0	19.30	
Grasmere	91	70	80.3	.....	
Huntington	94	68	80.4	2.84	
Hypoluxo	92	71	82.0	5.44	
Inverness	92	69	80.5	3.22	
Jasper	93	67	80.9	3.29	
Johnstown	96	.....	.....	2.64	
Kissimmee	92	69	80.8	3.26	
Lake City	94	68	80.7	1.04	
Macclenny	95	65	81.2	3.60	
Madison	97	62	80.9	4.68	
Malabar	94	67	81.8	6.92	
Manatee	94	67	80.9	2.26	
Marianna	96	66	79.3	12.23	
Merritt Island	90	72	81.2	3.04	
Miami	92	70	81.1	2.39	
Middleburg	95	65	79.9	5.00	
Molino	98	60	78.3	18.30	
Monticello	93	66	79.4	5.91	
Mount Pleasant	97	.....	.....	9.72	
New Smyrna	95	64	81.0	1.41	
Ocala	96	69	81.8	3.12	
Orange City	100	65	82.1	3.39	
Orange Home	96[c]	68[c]	81.6[c]	1.89	
Orlando	95	68	81.8	1.87	
Otter Creek	95	66	81.6	2.73	
Plant City	96	68	79.9	2.54	
Rockwell	95[f]	69[f]	81.8[f]	2.15	
St. Andrew	92	68	80.6	.....	
St. Augustine	91	70	80.0	1.52	
St. Leo	93	66	80.4	6.93	
Stephenville	98	60	82.0	2.11	
Switzerland	92	67	79.3	3.29	
Tallahassee	90	68	78.4	7.31	
Tarpon Springs	97	68	81.1	2.79	
Wausau	97[c]	64	80.9	13.77	
Georgia.					
Abbeville	.....	.....	.....	4.64	
Adairsville	87	63	75.5	6.30	
Albany	99	67	81.8	2.35	
Allapaha	96	61	80.4	1.30	
Americus	98	67	78.8	5.79	
Athens	87	64	74.4	5.81	
Bainbridge	98	64	80.6	4.23	
Blakely	98	60	77.0	5.70	
Brunswick	97	65	80.6	1.56	
Butler	.....	.....	.....	4.33	
Camak	93	62	75.7	3.17	
Carlton	.....	.....	.....	6.28	
Carrollton	92	62	75.1	6.77	
Clayton	86	54	71.4	13.72	
Columbus	97	68	80.6	8.74	
Cordele	95	64	78.4	2.54	
Covington	.....	.....	.....	4.65	
Cuthbert	95	65	79.2	2.68	
Dahlonega	88	59	72.8	10.79	
Dawson	97	67	81.5	2.52	
Diamond	84	58	71.4	6.50	
Dublin	.....	.....	.....	3.38	
Dudley	92	64	78.5	2.11	
Eastman	98	67	80.4	4.47	
Eatonton	96	64	78.2	3.15	
Elberton	93	62	76.6	6.74	
Experiment	90	64	76.8	3.78	
Fitzgerald	98[c]	62[f]	80.8[f]	3.59	
Fleming	100	61	80.2	9.83	
Forsyth	97	63	78.8	4.55	
Fort Gaines	91	67	78.8	6.77	
Gillsville	90	60	75.0	6.89	
Glenville	94	63	79.0	4.36	
Greenbush	87	62	74.6	4.60	
Greensboro	94	64	77.8	3.40	
Griffin	94	63	77.2	4.32	
Harrison	95	65	78.8	1.41	
Hawkinsville	98	66	80.0	3.16	
Lisbon	96	60	77.7	3.88	
Lost Mountain	91	61	75.1	4.86	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Georgia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Louisville	93	67	78.3	3.29	
Lumpkin	94	64	77.6	4.99	
Marshallville	95	62	79.3	2.06	
Mauzy	98[c]	66[b]	81.1[f]	3.42	
Milledgeville	93	66	78.8	4.25	
Milleo	95	58	79.0	2.32	
Montezuma	.....	.....	.....	4.20	
Monticello	92	64	77.6	4.08	
Morgan	92	67	79.0	2.96	
Newnan	95	61	77.0	4.30	
Oakdale	.....	.....	.....	6.21	
Point Peter	91	58	75.6	6.94	
Poulan	95	67	79.4	3.65	
Putnam	93	65	78.2	5.15	
Quitman	93	68	79.6	1.92	
Ramsey	89[c]	58[c]	75.2[c]	8.08	
Rome	94	61	75.4	3.98	
St. George	93	65	76.4	2.79	
St. Marys	96	66	79.8	3.10	
Screven	96	62	80.2	5.70	
Statesboro	98	63	79.4	2.04	
Talbotton	94	64	78.0	11.85	
Tallapoosa	94	62	76.4	7.91	
Toccoa	87	60	72.0	8.15	
Valdosta	94	66	79.9	1.18	
Valona	92	60	77.8	4.44	
Washington	88	65	75.6	7.05	
Waycross	97	66	80.5	1.81	
Waynesboro	93	62	77.6	2.77	
Westpoint	91	67	77.5	5.88	
Woodbury	91	64	76.4	4.96	
Idaho.					
American Falls	90	29	59.8	1.48	
Bannock River Cabin	87	26	55.4	0.72	
Blackfoot	90	26	58.6	0.45	
Buhl	92	32	64.8	0.34	
Caldwell	95	32	61.3	0.41	
Cambridge	96[c]	31[c]	64.3[c]	0.69	
Chesterfield	.....	.....	.....	T.	
Dent	93	33	60.3	1.06	
Dewey	.....	.....	.....	0.05	
Ellerslie	92	28	63.2	0.45	
Forney	93	18	52.6	0.14	
Garnett	100	41	68.8	0.23	
Hot Springs	94	37	64.9	0.40	
Idaho Falls	85	26	57.0	0.31	
Kellogg	91	27	56.8	0.70	
Lake	78	10	50.8	0.45	
Landore	79	25	53.0	1.32	
Lardo	83	21	51.4	0.64	
Lost River	83	26	55.4	0.43	
Lovell	90	23	55.1	0.49	
Meadows	88	25	54.4	0.69	
Milner	96	33	64.0	0.18	
Minidoka	92	31	62.5	0.06	
Moscow	90	37	60.7	0.60	
Mountain Home	96	29	63.0	0.38	
Murray	88	24	54.6	0.51	
Nevens Ranch	.....	.....	.....	0.42	
Oakley	87	30	61.2	0.36	
Orifino	99	33	61.3	0.91	
Paris	83	25	53.3	0.55	
Payette	99	31[c]	62.8[c]	0.59	
Pollock	93	37	65.1	0.74	
Poplars	.....	.....	.....	0.41	
Porthill	87	30	57.2	0.40	
Roosevelt	80	22	50.3	0.35	
St. Maries	95	28	59.0	0.57	
Salem	.....	.....	.....	0.52	
Salmon	91	25	56.6	0.15	
Standrod	.....	.....	.....	1.22	
Twin Falls	92	29	62.7	0.11	
Vernon	84	24	55.7	1.20	
Illinois.					
Albion	94	54	73.1	4.85	
Aledo	90	44	69.4	5.63	
Alexander	93	46	70.8	3.23	
Antioch	94	44	67.4	5.87	
Ashton	89	42	66.8	4.72	
Astoria	91	43	68.8	5.60	T.
Aurora	90	45	66.6	8.31	
Benton	94	48	73.6	7.02	
Bloomington	97	45	71.8	4.30	
Bushnell	96	45	71.4	5.72	
Cambridge	98	47	72.8	4.26	
Carlinville	93	50	72.0	4.96	
Carlyle	.....	.....	.....	5.26	
Carrollton	94	50	71.5	4.88	
Charleston	94	49	70.9	4.18	
Chester	94	50	74.2	7.78	
Cisne	96	51	74.5	5.43	
Coatsburg	90[d]	49[d]	71.8[d]	5.56	
Cobden	98	53	74.2	8.72	
Colchester	95	46	71.4	5.89	
Decatur	94	49	71.0	3.47	
Dixon	94	43	68.0	4.70	
Dwight	94	44	69.3	3.80	
Elgin	95	44	68.6	5.78	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Illinois—Cont'd.	°	°	°	*Ins.*	*Ins.*
Equality	94	50	74.8	5.06	
Flora	91	50	70.7	6.78	
Friendgrove	91	52	71.6	5.64	
Galva	97	42	69.7	4.02	
Grafton	.....	.....	.....	5.32	
Greenville	94	52	72.9	5.52	
Griggsville	95	48	71.6	6.56	
Halfway	94	53	73.6	6.79	
Havana	97	49	73.0	5.24	
Henry	93	41	69.6	5.03	
Hillsboro	98	49	72.7	5.38	
Hoopeston	89	47	69.0	2.31	
Joliet	91	47	68.4	5.68	
Kishwaukee	93	43	67.8	4.51	
Knoxville	93	44	69.1	4.30	
Lagrange	93	45	67.3	6.19	
Laharpe	96	44	71.2	4.10	
Lanark	94	38	67.6	3.70	
Lincoln	97	50[c]	72.2	3.72	
Loami	.....	.....	.....	2.96	
Martinsville	96	48	72.6	3.65	
Martinton	96	45	69.4	4.59	
Mascoutah	93	50	72.4	5.12	
Minonk	93	41	69.0	4.37	
Monmouth	97	42	70.8	8.98	
Morrison	92	43	68.0	3.85	
Morrisonville	92	48	71.0	2.90	
Mount Carmel	.....	.....	.....	5.66	
Mount Vernon	97	53	74.8	6.50	
New Burnside	93	50	73.3	5.43	
Olney	94	53	73.0	7.75	
Ottawa	95	45	70.4	5.09	
Palestine	92	50	72.2	4.05	
Pana	91	50	70.9	7.18	
Paris	94	47	70.8	3.93	
Philo	92	49	69.4	3.80	
Pontiac	91	47	70.2	3.56	
Rantoul	92	48	69.4	4.74	
Raum	94	52	74.4	4.11	
Riley	93	44	68.5	4.05	
Robinson	91	50	72.0	3.55	
Rockford	89	45	68.7	4.69	
Rushville	92	46	71.4	4.82	
St. Charles	94	44	68.6	7.47	
St. John	95	51	72.8	8.28	
Shobonier	94	50	73.5	4.70	
Streator	94	44	69.2	4.25	
Sullivan	94	47	71.2	4.31	
Sycamore	97	42	67.7	6.09	
Tilden	94	51	73.2	7.42	
Tiskilwa	97	42	70.6	6.25	
Tuscola	95	48	71.2	3.89	
Urbana	91	48	69.1	2.45	
Walnut	94	44	70.8	4.02	
Warsaw	.....	.....	.....	3.78	
Windsor	94	49	70.8	4.09	
Winnebago	91	42	67.6	4.68	
Yorkville	96	40	67.0	10.25	
Zion	90	42	67.2	2.31	
Indiana.					
Anderson	89	47	69.3	3.36	
Angola	88	40	67.6	2.68	
Auburn	90	42[c]	65.3[c]	2.52	
Bloomington	89	53	71.6	2.99	
Bluffton	96	39	70.5	1.10	
Butlerville	90	51	71.6	4.82	
Cambridge City	91	45	68.2	3.22	
Columbus	93	48	70.8	4.54	
Connersville	89	46	69.0	4.69	
Crawfordsville	94	46	69.8	4.38	
Delphi	93	46	68.6	3.68	
Elkhart	93	46	70.6	1.30	
Farmersburg	93	50	71.4	2.70	
Farmland	88	46	67.2	1.64	
Fort Wayne	92	45	69.0	2.08	
Franklin	92	48	70.2	5.19	
Greencastle	93[d]	49[d]	71.2[d]	5.21	
Greenfield	91	49	70.8	3.63	
Greensburg	93	50	71.4	4.47	
Hammond	90	49	69.2	2.92	
Holland	96	56	73.2	.....	
Huntington	91	45	69.6	2.47	
Jeffersonville	92	54	73.8	4.64	
Knox	91	45	68.8	1.51	
Kokomo	94	44	68.2	2.34	
Lafayette	92	49	69.8	3.16	
Laporte	93	43	66.9	2.26	
Lima	92	41	67.3	1.74	
Logansport	90	40	67.7	6.74	
Madison	92	53	73.4	9.12	
Marengo	90	50	71.4	5.54	
Marion	93	45	70.0	3.51	
Markle	91	41	67.6	3.55	
Mauzy	90[c]	45[c]	68.6[c]	3.10	
Moores Hill	90	50	70.4	4.34	
Mount Vernon	96	56	75.1	9.08	
Northfield	90	44	67.2	3.66	
Paoli	93	51	72.7	5.62	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Plymouth	93	42	68.5	2.19	
Princeton	94	53	73.6	5.35	
Rensselaer	93	44	68.2	2.80	
Richmond	90	45	68.8	2.41	
Rochester	85	47	67.8	3.33	
Rockville	90	46	70.4	6.78	
Rome	94	55	74.4	6.66	
Salamonia	90	43	68.3	2.11	
Salem	92	50	72.3	5.70	
Scottsburg	90	54	73.0	4.51	
Seymour	90	50	71.2	7.40	
Shelbyville	92	49	70.0	4.76	
South Bend	95	44	68.8	1.13	
Syracuse	93	42	69.6	4.12	
Terre Haute	92	51	72.8	3.67	
Veedersburg	92[a]	48[a]	70.5[a]	2.35	
Vevay	89	54	73.0	7.55	
Vincennes	96	52	73.6	5.23	
Washington	92	53	72.2	5.96	
Worthington	92	50	72.2	5.56	
Indian Territory.					
Ardmore	96	50	75.9	4.21	
Calvin	.....	.....	.....	5.66	
Durant	93[b]	54	76.6[d]	4.23	
Fairland	95	47	78.2	2.84	
Fort Gibson	.....	.....	.....	3.05	
Hartshorne	91	59	76.3	8.06	
Healdton	95	49	74.6	5.85	
Holdenville	92	50	75.0	4.60	
Marlow	93	50	74.0	6.24	
Muskogee	94	51	75.6	2.96	
Okmulgee	96	51	75.4	2.54	
Pauls Valley	92	46	73.8	6.60	
Ravia	95	53	76.6	3.37	
South McAlester	99	53	77.2	6.45	
Tulsa	93	50	75.8	2.30	
Vinita	94	50	74.5	1.17	
Wagoner	93	48	75.0	3.74	
Webbers Falls	98	51	75.7	3.27	
Iowa.					
Afton	95	37	67.6	2.43	
Albia	98	38	69.4	1.31	
Algona	89	35	65.2	5.39	
Allerton	98	39	70.4	2.04	
Alta	91	36	65.4	4.66	
Alton	94	32	63.4	6.11	
Amana	94	39	68.2	1.06	
Ames	92	35	66.8	3.14	
Atlantic	95	31	66.6	6.53	
Audubon	95	32	65.7	5.07	
Baxter	94[j]	37[h]	.....	6.56	
Bedford	94	39	68.5	1.98	
Belleplaine	92	39	67.4	2.20	
Bloomfield	95	42	69.9	3.99	
Bonaparte	93	44	71.0	3.91	
Boone	94	39	66.8	3.36	
Britt	90	36	65.6	5.84	
Buckingham	.....	.....	.....	2.78	
Burlington	95	46	71.1	5.13	
Carroll	93	36	65.6	3.35	
Cedar Rapids	96	41	70.8	0.99	
Chariton	97	38	68.5	3.68	
Clarinda	100	38	68.3	2.26	
Clearlake	90	36	66.0	3.00	
Clinton	91	40	68.4	2.54	
College Springs	92[a]	40[d]	68.5[d]	4.42	
Columbus Junction	92	48	69.8	2.23	
Corning	94	37	67.2	3.64	
Corydon	97	39	69.8	2.48	
Creston	94	39	67.2	4.41	
Cumberland	.....	.....	.....	3.33	
Decorah	91	37	66.1	5.50	
Delaware	90	37	66.2	2.76	
Denison	95	32	66.3	4.81	
Desoto	96	38	68.0	2.97	
Dows	93	33	65.3	3.36	
Earlham	95	34	65.8	2.33	
Eikader	93	34	67.0	5.81	
Elliott	95	33	66.8	4.26	
Estherville	93	32	63.6	4.25	
Forest City	93	38	66.7	7.12	
Fort Dodge	94	36	66.0	3.16	
Fort Madison	.....	.....	.....	4.58	
Gilman	.....	.....	.....	3.78	
Glenwood	95	40	67.3	5.57	
Grand Meadow	88	40	65.6	5.36	
Greene	91	37	66.1	4.86	
Greenfield	95	39	67.6	4.47	
Grinnell (near)	94	37	68.1	2.21	
Grundy Center	93	40	66.7	3.70	
Guthrie Center	93	35	66.6	1.98	
Hampton	95	37	68.5	7.07	
Hancock	95	40	67.8	5.60	
Harlan	93	34	65.7	4.89	
Hopeville	96	40	69.2	3.19	
Humbolt	88	34	64.7	1.82	
Idagrove	94	30	64.6	5.89	
Independence	93	34	67.2	1.50	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Indianola	93	39	67.6	3.34	
Inwood	93	32	63.8	6.42	
Iowa City	97	41	70.2	0.89	
Iowa Falls	90	35	64.8	2.89	
Jefferson	95	33	66.8	3.46	
Keosauqua	94	41	69.1	3.47	
Lacona	.....	.....	.....	3.92	
Larrabee	91	.....	64.8	4.99	
Leclaire	.....	.....	.....	2.53	
Lemars	92	32	64.5	8.23	
Lenox	92	40	68.0	3.46	
Leon	93	41	68.6	3.85	
Little Sioux	95	35	67.4	4.06	
Logan	93	34	66.0	8.99	
Maple Valley	.....	.....	.....	4.98	
Marshalltown	96	35	67.3	5.10	
Mason City	90	37	66.2	5.76	
Massena	99	36	69.2	3.42	
Mountayr	97	40	69.8	3.27	
Mount Pleasant	94	43	70.8	4.04	
Mount Vernon	94	40	69.8	0.64	
Muscatine	.....	.....	.....	2.67	
Nevada	.....	.....	.....	4.31	
New Hampton	87	38	64.8	4.36	
Northwood	88[f]	37[f]	64.6[f]	6.44	
Odebolt	98	35	67.3	7.84	
Ogden	94	35	68.0	3.11	
Olin	91	40	67.4	2.58	
Onawa	95	38	67.5	4.24	
Osage	90	35	65.2	5.14	
Oskaloosa	96	40	69.2	1.21	
Ottumwa	97	43	71.9	1.54	
Pacific Junction	94	35	66.4	5.12	
Pella	98	39	70.6	2.11	
Perry	94	35	67.1	2.32	
Plover	93	39	66.2	7.11	
Pocahontas	94	34	66.0	5.18	
Preston	90	39	66.2	2.53	
Ridgeway	93	38	67.7	6.11	
Rock Rapids	92	30	63.6	3.75	
Rockwell	94	32	65.4	4.46	
Sac City	93	37	64.6	4.68	
St. Charles	98	40	69.0	4.79	
Sheldon	94	33	65.4	6.01	
Sibley	92	35	62.8	5.69	
Sigourney	95	40	70.1	0.78	
Sioux Center	89	36	63.1	6.35	
Stuart	94	39	67.4	3.23	
Thurman	94	37	67.8	11.10	
Tipton	94	45	71.6	1.73	
Toledo	91	37	67.4	2.56	
Wapello	93	41	70.2	4.47	
Washington	93	43	69.7	2.20	
Washta	95	27	65.9	3.83	
Waterloo	95	36	67.8	2.59	
Waukee	91[c]	.....	67.6[c]	2.82	
Webster City	96	33	67.4	4.19	
Westbend	89	36	64.5	6.69	
Wilton Junction	89	44	68.6	2.94	
Winterset	92	37	67.8	4.75	
Woodburn	94	34	66.2	4.30	
Zearing	92	37	67.4	3.54	
Kansas.					
Abilene	.....	.....	.....	1.38	
Alton	100	31	69.8	3.16	
Anthony	92[k]	45[k]	70.5[k]	2.43	
Atchison	92	44	70.6	1.26	
Baker	92	39	69.2	5.44	
Burlington	95	45	73.2	4.63	
Chapman	99	41	71.0	3.68	
Cimarron	92	34	67.6	5.78	
Clay Center	99	37	69.8	4.82	
Colby	96	36	66.0	1.25	
Coldwater	92	43	71.0	7.77	
Columbus	91	48	73.6	3.58	
Coolidge	93	34	66.0	3.68	
Cottonwood Falls	93	39	71.0	3.69	
Cunningham	91[c]	41[d]	70.4[d]	9.35	
Dresden	98	34	67.2	1.96	
Eldorado	90	.....	70.8	.....	
Ellinwood	92	39	69.3	5.51	
Ellsworth	92	35	69.0	6.65	
Emporia	96	44	71.7	1.61	
Englewood	94[c]	.....	72.2[d]	6.48	
Enterprise	95	42	69.8	5.09	
Eureka	.....	.....	.....	3.48	
Fall River	91	46	72.4	2.60	
Farnsworth	96	28	67.6	1.97	
Fort Scott	94	46	73.2	4.21	
Frankfort	100	36	70.0	5.05	
Fredonia	94	42	72.8	4.43	
Garden City	94	34	68.9	3.05	
Garnett	94	41	72.0	4.60	
Goodland	95	40	64.4	1.54	
Gove[e]	95	41	70.0	2.32	
Grenola	90	45	71.5	5.78	
Hanover	99	38	70.2	4.20	
Harrison	99	32	67.6	3.01	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hays	96	35	68.4	3.39	
Horton	95	42	70.2	3.55	
Hoxie	95[c]	32[c]	66.1[c]	1.30	
Hugoton	93	36	68.2	3.63	
Hutchinson	92	40	70.4	3.90	
Independence	95	47	75.2	3.54	
Jetmore	95	33	69.4	3.19	
Jewell	100	36	67.4	2.62	
La Crosse	95	39	69.1	4.93	
Lakin	90	35	66.2	1.69	
Larned	93	33	67.8	5.86	
Lawrence	90	45	70.2	1.52	
Lebanon	100[c]	40[c]	69.6[c]	3.00	
Lebo	92	42	71.1	3.54	
Macksville	90	36	67.8	10.20	
McPherson	96	38	70.6	4.30	
Madison	95	42	71.6	3.86	
Manhattan *b*	100	38	72.0	4.62	
Manhattan *c*	98	38	70.4	4.02	
Medicine Lodge	94	44	72.4	3.45	
Minneapolis	97	37	70.2	3.63	
Moran	94	45	73.4	3.39	
Mounthope	.....	.....	.....	2.85	
Neosho Rapids	.....	.....	.....	1.87	
Ness City	91[c]	38	66.8[c]	2.80	
Newton	93	39	71.4	4.75	
Norton	99	29	68.2	0.50	
Norwich	91	42	73.2	4.29	
Oberlin	.....	.....	.....	1.75	
Olathe	90	44	70.8	1.71	
Osage City	95	41	71.4	2.94	
Oswego	92	48	74.2	2.75	
Ottawa	94	40	71.2	1.85	
Paola	97	44	73.6	2.82	
Phillipsburg	99	37	68.9	1.90	
Plainville	96	38	67.6	3.80	
Pleasanton	90	46	73.4	5.87	
Pratt	91	42	71.6	9.97	
Republic	97	35	68.4	2.91	
Rome	95	43	72.6	5.28	
Russell	96	39	68.2	7.87	
Salina	08	39	71.1	2.67	
Scott	95	30	67.5	0.98	
Sedan	92	42	72.6	3.95	
Sola	.....	.....	.....	3.60	
Toronto	97	40	72.0	8.18	
Ulysses[d]	94[k]	38[j]	70.8[k]	2.70	
Valley Falls	91	40	70.5	1.34	
Wakeeney	94	38	68.2	1.59	
Wakeeney (near)	.....	.....	.....	1.84	
Wallace	95	32	66.0	1.35	
Walnut	93	47[j]	74.7[c]	4.69	
Wamego	92	47	70.2	7.07	
Winfield	89	50	71.4	3.63	
Yates Center	95	44	73.2	6.93	
Kentucky.					
Alpha	85	54	72.8	8.13	
Anchorage	92	51	71.8	5.35	
Bardstown	94	55	74.2	8.70	
Beattyville	92	51	72.5	5.30	
Beaver Dam	93	53	73.4	5.00	
Blandville	88	56	74.2	6.04	
Bowling Green	92	57	74.6	7.56	
Burnside	90	55	74.4	6.30	
Cadiz	94	57	75.2	8.43	
Calhoun	94	55	75.0	6.13	
Catlettsburg	92	54	73.2	3.08	
Earlington	93	57	74.0	5.34	
Edmonton	89	52	73.0	7.55	
Eubanks	89	54	71.3	4.12	
Falmouth	.....	.....	.....	5.05	
Farmers	90	50	72.3	5.24	
Frankfort	87	53	71.9	10.56	
Franklin	94	56	74.4	12.67	
Greensburg	92	50	72.3	6.65	
High Bridge	94	.....	.....	4.85	
Hopkinsville	94	57	74.8	8.71	
Irvington	88	56	72.9	7.54	
Jackson	93	.....	.....	3.35	
Leitchfield	89	56	72.5	7.73	
Loretto	95	50	74.5	7.35	
Lynnville	92	59	75.0	5.68	
Marion	92	56	74.8	3.92	
Maysville	95	49	74.5	2.55	
Middlesboro	89	56	73.4	5.56	
Mount Sterling	87	53	71.6	4.73	
Owensboro	90	58	74.0	6.76	
Owenton	87	55	70.9	5.09	
Paducah	92	65	77.0	4.44	
Richmond	89	53	72.1	6.04	
St. John	90	54	71.4	5.43	
Scott	92	50	71.4	5.12	
Shelby City	92	50	70.8	8.39	
Shelbyville	93	50	72.4	7.60	
Taylorsville	86	51	71.4	7.62	
Williamsburg	89	56	72.4	3.83	
Williamstown	90	45	70.2	6.79	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Louisiana.	°	°	°	*Ins.*	*Ins.*
Abbeville	97	65	80.2	5.66	
Alexandria	102	62	81.9	2.88	
Amite	97	64	79.0	9.46	
Baton Rouge	99	63	81.0	3.32	
Burnside	94	64	78.4	5.42	
Calhoun	95[d]	57[b]	78.2[c]	9.73	
Cameron	93	66	80.6	4.32	
Cheneyville	98	66	80.0	2.06	
Clinton	94	65	78.0	8.16	
Collinston	100	57	79.2	10.54	
Covington	96	64	79.0	6.09	
Crowley	.....	.....	.....	5.21	
Donaldsonville	97	65	81.1	2.69	
Farmerville	100	57	79.0	6.56	
Franklin	97	66	80.4	5.69	
Grand Coteau	96	64	80.2	2.07	
Houma	93	65	78.7	10.59	
Jennings	96	63	80.2	3.54	
Lafayette	96	65	79.9	1.49	
Lake Charles	100	64	81.6	1.25	
Lawrence	96	68	80.8	9.57	
Libertyhill	99	60	78.8	6.91	
Logansport	.....	.....	.....	6.50	
Mansfield	96	63	78.9	4.06	
Melville	100	62	79.1	4.19	
Minden	98	61	79.4	5.70	
Monroe	100	67	82.4	6.77	
Morgan City	.....	.....	.....	5.06	
New Iberia	.....	.....	.....	4.97	
Opelousas	99	60	80.0	1.41	
Pearl River	.....	.....	.....	5.62	
Plain Dealing	97	61	79.6	5.51	
Rayne	97	63	79.6	1.73	
Reserve	98	62	80.2	1.70	
Robeline	97	60	78.4	3.39	
Ruston	100	59	80.8	5.50	
St. Francisville	98	61	78.8	8.95	
Schriever	99	64	80.5	4.91	
Simmesport	.....	.....	.....	3.18	
Sugar Experiment Station	92	68	79.8	8.73	
Sugartown	93	64	79.8	3.99	
Maine.					
Bar Harbor	81	33	58.8	1.40	
Chesuncook	79	41	56.0	3.10	
Cornish	89	31	61.8	0.90	
Danforth	.....	.....	.....	1.41	
Debsconeag	83	33	58.2	2.89	
Fairfield	85	31	59.6	1.55	
Farmington	83	26	57.8	0.65	
Gardiner	84	33	59.6	0.94	
Grant Farm	.....	.....	.....	3.34	
Greenville	82	27	56.0	2.73	
Houlton	82	29	55.0	1.20	
Lewiston	90	35	62.2	0.85	
Madison	86	29	57.0	1.09	
Mayfield	77	32	56.4	2.23	
Millinocket	82	31	57.6	3.16	
North Bridgton	90	32	61.6	0.83	
Oquossoc	.....	.....	.....	4.50	
Orono	82	27	59.2	1.51	
Patten	78	26	54.8	1.52	
Rumford Falls	86	32	59.7	1.01	
The Forks	.....	.....	.....	3.79	
Vanburen	84	24	54.7	3.50	
Winslow	86	27	60.1	1.16	
Maryland.					
Annapolis	90	57	73.6	1.18	
Bachmans Valley	91	44	69.2	2.08	
Cambridge	93	49	73.6	1.99	
Cheltenham	91	50	71.6	1.25	
Chestertown	88	48	70.6	1.46	
Chewsville	92	46	70.5	1.41	
Clearspring	88	45	68.8	0.61	
Coleman	92	51	72.1	1.68	
Collegepark	92	45	71.0	0.50	
Cumberland	.....	.....	.....	1.16	
Darlington	90	46	70.6	0.56	
Deerpark	88	37	64.0	3.38	
Easton	88	49	71.6	1.28	
Fallston	90	44	69.6	0.63	
Frederick	91	45	71.0	0.45	
Frostburg	.....	.....	.....	1.95	
Grantsville	87	40	64.0	2.07	
Great Falls	92	44	71.5	0.29	
Greenspring Furnace	90	41	69.8	0.31	
Harney	.....	.....	.....	1.39	
Jewell	89	49	71.5	0.71	
Johns Hopkins Hospital	.....	.....	.....	6.22	
Keedysville	93	43	71.0	0.45	
Lake Montebello	93	48	71.2	0.33	
Laurel	92	49	72.8	0.68	
Monrovia	91	43	70.6	0.61	
Mount St. Marys College	90	44	70.2	1.06	
Oakland	88	36	64.5	3.74	
Porto Bello	92	56	74.0	2.14	
Princess Anne	90	50	71.6	0.95	
Salisbury	94	51	72.8	2.52	
Solomons	92	58	73.8	3.60	
Maryland—Cont'd.					
Takoma Park	87	48	70.1	0.68	
Taneytown	90	41	69.0	1.24	
Van Bibber	87	46	69.6	1.10	
Westernport	92	44	69.4	1.42	
Woodstock	87	45	71.6	0.73	
Massachusetts.					
Amherst	91	32	63.8	2.59	
Bluehill (summit)	88	39	63.3	4.18	
Cambridge	91	38	65.0	2.44	
Chestnuthill	93	35	66.3	2.92	
Concord	89	30	61.2	2.15	
Fallriver	85	41	63.8	2.92	
Fitchburg	92	35	64.4	1.61	
Framingham	90	31	62.6	2.91	
Groton	88	32	61.6	1.53	
Hyannis	.....	.....	.....	2.91	
Jefferson	.....	.....	.....	2.94	
Lawrence	89	36	63.4	1.44	
Leominster	.....	.....	.....	1.64	
Lowell	89	36	66.3	1.43	
Middleboro	89	32	61.8	3.14	
Monson	87	32	62.6	2.25	
New Bedford	89	44	64.8	5.14	
Plymouth	84	43	62.8	3.44	
Provincetown	88	47	64.0	2.14	
Salem	.....	.....	.....	2.07	
Somerset	93	38	66.1	3.08	
Sterling	.....	.....	.....	2.34	
Taunton	89	34	62.4	2.79	
Webster	.....	.....	.....	2.55	
Westboro	91	32	64.6	3.59	
Weston	87	31	61.0	2.56	
Williamstown	83	34	61.2	1.63	
Winchendon	.....	.....	.....	1.80	
Worcester	88	40	64.9	2.48	
Michigan.					
Adrian	92	41	67.5	2.00	
Agricultural College	93	40	67.5	0.76	
Allegan	.....	45[e]	.....	.....	
Alma	94	38	65.2	3.05	
Ann Arbor	92	40	68.2	1.62	
Arbela	94	39	67.5	0.84	
Ball Mountain	90	39	66.3	1.97	
Baraga	95	30	58.6	3.25	
Battlecreek	91	42	67.1	1.57	
Bay City	93	43	67.6	2.85	
Berlin	96	36	64.2	2.64	
Big Rapids	92	39	65.2	3.98	
Bloomingdale	93	43	68.4	2.60	
Calumet	85	36	60.8	2.69	
Carsonville	92	37	65.8	0.60	
Cassopolis	92	44	69.0	1.00	
Charlevoix	94	44	66.8	1.29	
Charlotte	95	39	66.5	1.08	
Chatham	91	29	58.4	2.77	
Cheboygan	95	39	66.2	1.97	
Clinton	92	38	66.4	1.60	
Coldwater	91	40	67.4	1.22	
Concord	90	40	66.5	0.76	
Deer Park	92	36	59.8	1.70	
Detour	86	45	61.5	2.41	
Dundee	90	40	66.6	1.99	
Eagle Harbor	88	43	61.4	2.27	
East Tawas	90	38	64.4	3.04	
Eloise	92	40	67.8	2.01	
Flint	93	37	65.8	1.06	
Frankfort	84	45	65.7	2.51	
Grand Marais	87	42	61.3	1.81	
Grape	90	38	66.4	2.36	
Grasslake	92	39	67.7	1.28	
Grayling	93	33	64.6	1.50	
Hagar	92	42	66.2	2.17	
Harbor Beach	92	40	65.3	1.76	
Harrison	91	37	63.8	3.33	
Harrisville	95	39	65.3	3.29	
Hastings	94	37	66.2	1.64	
Hayes	93	38	66.9	1.80	
Highland	.....	.....	.....	1.16	
Hillsdale	88	42	66.7	1.48	
Holland	92	42	67.0	6.75	
Howell	92	40	66.8	0.86	
Humboldt	88	24	58.2	1.45	
Iron Mountain	91	33	61.8	3.78	
Iron River	92	25	59.0	2.78	
Ironwood	99	32	62.9	4.39	
Ishpeming	88	30	58.2	3.51	
Isle Royal	72	44	57.6	2.39	
Ivan	94	34	65.1	1.81	
Jackson	92	41	68.9	0.79	
Jeddo	91	40	66.7	1.23	
Kalamazoo	94	44	68.2	1.38	
Lansing	92	41	67.5	0.74	
Ludington	88[e]	41[e]	65.8[e]	3.28	
Mackinac Island	86	39	63.0	3.26	
Mackinaw	78	44	62.4	.....	
Manistee	91	38	65.9	.....	
Maple Ridge	90	30	59.2	2.74	
Marlboro	95	34	65.4	3.53	
Michigan—Cont'd.					
Menominee	90	39	63.9	2.81	
Mio	90	29	62.0	2.48	
Montague	96	40	68.0	4.31	
Mount Clemens	94	40	66.7	2.32	
Mount Pleasant	.....	.....	.....	3.50	
Muskegon	88	40	65.3	4.94	
Newberry	92	.....	.....	3.50	
Old Mission	92	43	65.8	1.60	
Olivet	88	40	66.2	1.56	
Omer	91	32	63.3	1.59	
Ovid	97	35	67.0	1.50	
Owosso	93	30	66.7	0.78	
Petoskey	88[i]	38[i]	66.0[i]	.....	
Plymouth	94	32	67.2	1.50	
Pontiac	92	38	66.2	0.34	
Port Austin	.....	.....	.....	1.60	
Powers	90	32	60.2	.....	
Reed City	95	38	65.2	2.00	
Saginaw (W. S.)	94	41	67.2	2.04	
St. James	87	43	63.2	2.45	
St. Johns	94[d]	38[d]	67.4[d]	1.21	
St. Joseph	87[h]	49[h]	68.1[h]	2.09	
Slocum	93	37	65.2	5.03	
South Haven	88	41	63.0	2.95	
Stanton	93	38	65.7	2.18	
Thomaston	92	24	62.4	.....	
Thornville	90	42	67.5	1.37	
Traverse City	91	40	65.9	2.84	
Vassar	92	40	67.0	1.08	
Wasepi	95	40	66.1	1.14	
Webberville	92	36	65.8	1.10	
Wetmore	92	22	58.8	.....	
Whitefish Point	84	34	58.8	1.57	
Woodlawn	90	28	60.6	1.96	
Ypsilanti	91	40	65.7	1.92	
Minnesota.					
Albert Lea	92	37	65.8	5.40	
Alexandria	95	33	62.8	3.18	
Amboy	94	34	66.0	3.91	
Angus	93	29	62.4	1.37	
Ashby	88	40	62.8	2.97	
Bagley	93	25	61.0	1.84	
Beardsley	95	.....	.....	1.29	
Beaulieu	96	32	61.8	2.18	
Bird Island	92	34	64.8	1.64	
Caledonia	87	40	64.8	5.49	
Campbell	90	32	61.0	2.44	
Cass Lake	.....	.....	.....	3.52	
Collegeville	90	39	63.9	3.03	
Crookston	91	36	62.7	1.59	
Detroit	92	31	60.0	3.51	
Fairmount	88	38	64.2	4.00	
Faribault	90	33	65.0	4.79	
Farmington	90	38	63.2	5.41	
Fergus Falls	93	41	65.0	2.35	
Fort Ripley	97	40	66.6	3.69	
Glencoe	92	35	64.7	3.08	
Grand Meadow	91	34	65.4	7.45	
Hallock	96	32	61.6	0.87	
Halstead	95	32	62.3	2.35	
Hinckley	93	31	62.6	3.66	
Howland	73	31	53.2	1.90	
International Falls	96	24	60.6	1.25	
Lake Winnibigoshish	94	35	61.4	2.31	
Leech	92	30	59.0	5.87	
Little Falls	94	33	64.2	3.39	
Long Prairie	94	28	63.0	7.61	
Luverne	91	33	62.4	5.25	
Lynd	95	31	63.6	3.29	
Mankato	.....	.....	.....	3.58	
Maplelain	91	35	63.7	4.93	
Milaca	92	30	62.0	4.51	
Milan	91	35	62.9	4.12	
Minneapolis[e][i]	92	35	63.9	4.65	
Montevideo	92	36	64.0	4.48	
Mora	92	28	61.8	3.50	
Morris	91	38	63.1	3.24	
Mount Iron	92	26	58.6	5.47	
New London	99	36	64.2	3.05	
New Richland	92	36	66.7	5.63	
New Ulm	95	40	66.1	3.07	
Park Rapids	96	30	62.0	3.42	
Pine River	92	28	62.8	3.83	
Pipestone	90	39	61.8	5.06	
Pokegama Falls	92	27	61.2	3.15	
Reeds	.....	.....	.....	4.20	
St. Charles	93	31	66.2	5.66	
St. Cloud	96	32	64.4	4.33	
St. Peter	88	35	62.9	2.52	
Sandy Lake Dam	91	31	63.1	3.65	
Shakopee	90	36	64.8	3.91	
Stillwater	.....	.....	.....	3.94	
Taylors Falls	90	31	64.2	.....	
Tonka	.....	.....	.....	3.48	
Two Harbors	92	33	62.4	3.25	
Wabasha	95	37	67.3	5.07	
Wadena	94	30	62.5	3.53	
Willow River	94	27	62.0	6.27	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Minnesota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Windom	97	32	65.2	3.45	
Winnebago	93	35	65.9	3.33	
Winona	90	38	64.8	5.49	
Worthington	89	32	62.4	3.36	
Zumborta	87	32	63.8	3.58	
Mississippi.					
Aberdeen	101	63	79.4	10.27	
Agricultural College	.....	.....	.....	8.87	
Austin	94	60	76.2	7.41	
Batesville	96	63	78.3	10.37	
Bay St. Louis	93	67	79.6	6.83	
Bellefontaine	94	60	77.6	7.23	
Biloxi	96	68	81.2	11.84	
Booneville	92	64	76.8	5.84	
Brookhaven	99	63	78.6	10.55	
Canton	98	64	78.4	8.15	
Columbia	.....	.....	.....	16.70	
Columbus	97	62	79.0	6.13	
Corinth	90	60	75.8	5.62	
Crystal Springs	97	64	78.6	9.57	
Duck Hill	98	60	78.4	8.81	
Edwards	97	64	79.1	8.59	
Enterprise	.....	.....	.....	8.24	
Fayette	92	60	76.7	7.64	
Fayette (near)	.....	.....	.....	8.03	
Fort Ripley	.....	.....	.....	3.69	
Greenville	94	63	77.5	8.80	
Greenville	.....	.....	.....	8.80	
Greenwood	97	63	77.9	8.36	
Hattiesburg	98	62	80.1	11.66	
Hazlehurst	99	64	78.5	9.10	
Hernando	96	60	76.2	6.13	
Holly Springs	95	64	76.9	9.69	
Jackson	95	64	78.2	14.77	
Kosciusko	99	63	78.6	8.40	
Lake	95	63	77.8	12.00	
Lake Como	100	62	78.8	11.15	
Laurel	97[d]	62[d]	78.6[d]	10.39	
Leakesville	99	65	80.3	14.25	
Louisville	95	63[b]	77.0	9.71	
McNeill	95	65	79.4	10.23	
Macon	98	65	79.4	8.36	
Magee	100	60	78.8	13.62	
Magnolia	97	63	79.0	7.22	
Merrill	.....	.....	.....	13.25	
Natchez	96	63	79.0	4.15	
Nitta Yuma	95[d]	63	80.2	.....	
Okolona	99	64	79.1	5.58	
Pearlington	95	65	78.8	7.27	
Pecan	95	67	79.7	9.17	
Pittsboro	96	60	77.0	5.87	
Pontotoc	91	64	75.9	8.78	
Porterville	97	64	79.0	8.24	
Port Gibson	99	61	78.7	7.10	
Quitman	98	63[l]	79.2[d]	9.77	
Ripley	95	59	76.2	12.29	
Shoccoe	96	64	78.2	13.14	
Shubuta	.....	.....	.....	10.98	
Stonington	.....	.....	.....	8.02	
Suffolk	98	62	79.2	5.42	
Tchula	99	65	79.4	11.40	
Tupelo	95	62	77.0	7.68	
University	96	63	77.6	8.71	
Utica	98	63	79.8	.....	
Walnutgrove	92[e]	65[e]	77.3[e]	11.93	
Watervalley	98	63	78.0	9.50	
Waynesboro	96	64	76.9	9.42	
Woodville	96	62	79.1	4.09	
Yazoo City	96	63	78.0	7.56	
Missouri.					
Albany	.....	.....	.....	3.70	
Appleton City	95	46	74.0	2.39	
Arthur	93	45	73.2	2.28	
Avalon	94	42	72.4	0.92	
Belle	94	50	71.1	4.74	
Bethany	91	36	68.7	1.77	
Bolivar	92	47	72.6	4.56	
Brunswick	95	45	71.4	2.64	
Caruthersville	96	55	75.8	5.68	
Conception	93	41	69.8	1.59	
Dean	93	50	73.7	2.17	
Darksville	94	46	.....	3.39	
De Soto	96	50	72.4	6.14	
Doniphan	90	54	73.0	3.73	
Eldorado Springs	93	46	73.0	2.09	
Fairport	.....	.....	.....	3.31	
Fayette	94	49	71.6	4.10	
Fulton	97	49	73.4	4.39	
Gads Hill	92	50	73.0	5.76	
Gano	93	52	72.0	5.50	
Glasgow	.....	.....	.....	1.90	
Goodland	89	52	70.2	6.49	
Gorin	.....	.....	.....	4.07	
Grant City	95	42	69.4	5.47	
Harrisonville	94	47	71.8	2.98	
Hazlehurst	.....	.....	.....	1.98	
Hermann	.....	.....	.....	6.31	
Houston	91	52	70.6	7.27	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Missouri—Cont'd.	°	°	°	*Ins.*	*Ins.*
Huntsville	.....	.....	.....	4.36	
Ironton	92	52	71.2	9.81	
Jackson	95	52	75.6	8.05	
Jefferson City	97	49	72.0	4.12	
Kidder	95	41	69.5	2.28	
Koshkonong	92	54	72.9	3.02	
Lamar	95	53	73.8	2.00	
Lamonte	.....	.....	.....	4.38	
Lebanon	90	53	71.7	5.17	
Lexington	93	47	72.2	1.20	
Liberty	93	43	72.2	1.01	
Lockwood	91	54	72.9	2.60	
Louisiana	95	43	71.9	4.83	
Macon	94	46	71.6	6.01	
Marblehill	94	52	73.6	9.31	
Marshall	94	44	71.9	3.33	
Maryville	97	41	69.4	3.02	
Mexico	96	47	70.3	7.12	
Monroe	93	46	70.4	5.39	
Montgomery	97	45	71.5	4.28	
Mountain Grove	87	51	70.4	9.16	
Mount Vernon	93	48	72.3	3.98	
Neosho	92	48	72.8	4.13	
New Haven	93	54	73.4	5.35	
New Madrid	.....	.....	.....	5.50	
New Palestine	96	50	73.6	4.40	
Oakfield	94	53	73.2	5.24	
Oregon	91	40	69.4	3.20	
Osceola	.....	.....	.....	2.44	
Princeton	98	45	71.7	4.47	
Rockport	.....	.....	.....	4.65	
Rolla	.....	.....	.....	7.08	
St. Charles	94	52	72.9	3.80	
St. Joseph	.....	.....	.....	0.74	
Sarcoxie	.....	.....	.....	5.55	
Sedalia	92	46	72.2	2.72	
Seymour	87	50	70.2	7.39	
Sikeston	92	54	74.6	6.65	
Steffenville	96	45	72.4	5.30	
Sublett	93	43	70.0	1.91	
Trenton	89	45	70.8	0.27	
Unionville	94	40	69.8	2.43	
Versailles	96	50	75.0	7.66	
Warrenton	94	50	71.5	6.48	
Warsaw	96	45	72.8	3.52	
Wheatland	.....	.....	.....	2.75	
Willowsprings	85	47	68.0	6.90	
Windsor	93	41	70.8	1.18	
Montana.					
Absarokee	.....	.....	.....	0.94	
Adell	86	24	55.5	1.39	T.
Anaconda	86	26	56.9	0.85	T.
Augusta	86	22	54.4	0.51	
Babb	78	25	52.0	0.43	
Bear Creek	89[k]	28[k]	53.6[k]	1.31	
Billings	99[e]	31[e]	64.0[e]	0.53	
Bozeman	82	30	55.6	1.38	
Boulder	87	24	55.0	0.30	
Butte	79	25	52.6	0.50	
Canyon Ferry	92	29	58.2	1.12	
Cascade	94	28	60.2	0.90	
Chester	87	25	57.4	0.57	
Chinook	96	29	60.7	0.94	
Choteau	90	26	58.3	0.28	
Clear Creek	86	29	56.2	1.88	
Columbia Falls	86	23	55.2	0.60	
Copper	.....	.....	.....	1.18	0.2
Crow Agency	90	29[e]	60.7[d]	0.80	
Culbertson	96	29	61.0	2.93	
Dayton	86	29	55.7	1.08	
Decker	93	28	61.4	0.78	
Dillon	83	28	55.6	0.88	
Ekalaka	97	29	63.1	0.76	
Evans	88	28	56.9	1.59	
Fallon	101	34	68.0	0.17	
Forsyth	100	29	63.8	1.21	
Fort Benton	92	34	59.9	0.90	
Fort Harrison	90	33	62.0	.....	
Glasgow	93	27	60.3	1.78	
Gold Butte	.....	.....	.....	0.08	
Graham	96[k]	28[k]	61.0[k]	1.27	
Grave Creek Cabin	87	23	53.3	0.70	
Grayling	75	14	46.0	0.73	
Greatfalls	88	34	60.1	0.63	
Hamilton	85	32	57.8	1.04	
Homepark	.....	.....	.....	1.35	
Huntley	95	30	62.5	0.52	
Jordan	97	25	61.2	0.15	
Lakeview	.....	.....	.....	1.40	
Lame Deer	95[e]	26[e]	60.0[e]	0.36	
Lewistown	94	29	58.2	2.10	
Livingston	88	28	60.5	1.06	
Lodge Grass	91	26	60.2	0.58	
Malta	93	30	60.0	1.86	
Marion	84[l]	16	50.7[f]	0.60	
Marysville	85	25	55.3	2.99	T.
Missoula	89[e]	30[e]	58.9[e]	T.	
Mullets Ranch	.....	.....	.....	1.88	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Nye	.....	.....	.....	1.35	
Ovando	.....	.....	.....	1.51	
Philipsburg	84	22	54.4	1.83	2.0
Plains	88	29	57.8	0.05	
Plentywood	105[d]	25[e]	65.1[e]	2.30	
Polson	88	34	59.7	0.63	
Poplar	98	29	61.5	2.08	
Raymond	.....	.....	.....	T.	
Redlodge	84	26	55.2	1.24	
Renovo	85	25	56.2	0.60	
Ridgelawn	98	32	62.4	1.50	
St. Peter	84	32	59.2	1.06	
Saltese	.....	.....	.....	0.35	
Springbrook	102	32	62.6	1.83	
Steele	93	33	61.6	0.46	
Tokna	99	32[e]	63.1	1.72	
Townsend	.....	.....	.....	0.90	
Troy	88	27	56.0	0.71	
Twin Bridges	90	25	57.5	1.10	
Utica	90	33	59.0	0.99	T.
Warrick	85	29	56.0	1.37	
Wolf Creek	89	28	57.4	1.18	
Wolf Point	.....	.....	.....	2.16	
Nebraska					
Agate	90	31	58.1	2.79	
Agee	102	41	62.0	3.97	
Ainsworth	100	36	63.4	3.10	
Albion	.....	.....	.....	3.14	
Alliance	95	34	61.4	1.32	
Alma	96	29	66.0	1.98	
Anoka	.....	.....	.....	3.66	
Arapaho	.....	.....	.....	1.51	
Arcadia	.....	.....	.....	2.85	
Ashland	98	34	68.6	6.84	
Ashton	.....	.....	.....	1.96	
Atkinson	99	37	63.1	1.57	
Auburn	94	37	67.2	2.81	
Aurora	100	36	68.2	3.20	
Beatrice	94	36	68.1	4.51	
Beaver	100	34	67.6	1.54	
Bellevue	97	43	68.7	5.50	
Benkleman	.....	.....	.....	1.05	
Blair	95	35	66.5	5.67	
Bloomfield	98	32	64.2	7.18	
Bluehill	.....	.....	.....	2.03	
Bridgeport	94	30	61.2	0.98	
Broken Bow	97	30	63.0	2.55	
Burchard	.....	.....	.....	5.49	
Burge	.....	.....	.....	4.37	
Burwell	.....	.....	.....	3.50	
Callaway	98	32	64.6	4.17	
Central City	.....	.....	.....	2.24	
Chester	.....	.....	.....	3.06	
Clearwater	101	31	64.6	7.29	
Cody	.....	.....	.....	2.80	
Columbus	98	32	65.8	3.88	
Crawford	.....	.....	.....	3.56	
Crete	96	41	68.8	5.27	
Culbertson	99	32	63.0	0.87	
David City	92	39	65.9	3.51	
Dawson	100	39	70.4	7.77	
Dubois	.....	.....	.....	4.99	
Duff	.....	.....	.....	2.10	
Dunning	.....	.....	.....	1.55	
Edgar	.....	.....	.....	3.43	
Ellis	.....	.....	.....	3.95	
Ericson	.....	.....	.....	5.38	
Ewing	.....	.....	.....	4.31	
Fairbury	99	33	69.2	4.89	
Fairmont	97	32	65.2	3.14	
Fort Robinson	96	33	60.7	3.48	
Franklin	100[l]	.....	.....	1.14	
Fremont	97	35	67.0	5.80	
Fullerton	.....	.....	.....	3.05	
Geneva	98	33	67.2	2.35	
Genoa (near)	96	35	64.4	3.98	
Gosper	.....	.....	.....	2.51	
Gothenburg	101	31	66.0	1.62	
Grand Island	100	32	67.0	2.39	
Grant	99	35	63.9	1.78	
Greely	.....	.....	.....	2.70	
Guide Rock	.....	.....	.....	3.32	
Haigler	.....	.....	.....	1.60	
Halsey	98	33	62.1	3.17	
Hartington	95	32	64.0	7.32	
Harvard	95	33	64.7	3.21	
Hastings[d][l]	95	47	68.2	1.73	
Hayes Center	99	38	67.5	0.78	
Hay Springs	95	32	60.1	2.37	
Hebron	99	35	67.6	2.86	
Hendley	.....	.....	.....	1.30	
Hickman	.....	.....	.....	6.00	
Holbrook	95	29	64.4	1.39	
Holdrege	96	37	66.7	2.87	
Hooper	94	36	65.2	6.03	
Imperial	98	35	64.8	2.80	
Kearney	96	40	67.2	4.27	
Kennedy	98	36	62.7	3.21	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Kimball	90	35	59.2	1.01	
Kirkwood	102	35	64.2	3.08	
Leavitt	98	34	67.0	5.31	
Lexington	96	30	63.4	2.25	
Lodgepole	92	33	60.8	2.10	
Loup	96	30	64.2	2.30	
Lynch	103	30	65.8	3.34	
McCook				1.70	
McCool				2.79	
Madison	94	33	64.7	4.45	
Marquette	99	39		3.41	
Mason				2.84	
Merriman				1.40	
Minden	98	29	65.8	1.74	
Monroe				4.47	
Nebraska City	96	36	68.6	8.65	
Nemaha				5.24	
Norfolk	97	31	64.6	6.11	
North Loup	100	28	64.1	3.12	
Oakdale	97	30	63.0	5.12	
Oakland	96	32	65.1	4.94	
Odell				4.21	
Ord				6.21	
Palmer				3.20	
Palmyra[4]	98	42	67.9	7.75	
Pawnee City	96	35	68.7	3.47	
Plymouth	97	36	68.4	4.04	
Purdum	98	37	63.5	2.78	
Ravenna	96	29	64.9	2.35	
Redcloud	93	29[1]	65.8[2]	2.40	
Republican				2.00	
Rulo				8.77	
St. Libory				2.43	
St. Paul	99	33	66.6	2.39	
Santee	101	35	66.7	3.00	
Schuyler				4.40	
Seward	98	34	67.6	8.70	
Smithfield				1.85	
Springview	98	36	62.8	3.24	
Stanton	96	34	67.5	4.61	
Strang				2.23	
Stratton				0.74	
Stromsburg				5.37	
Superior	100	34	68.0	2.52	
Syracuse				5.80	
Tablerock				4.85	
Tecumseh	98	37	68.0	5.69	
Tekamah	95	36	67.0	5.00	
Turlington	96	40	68.5	6.93	
University Farm	96	36	68.0	6.79	
Wahoo				9.77	
Wakefield	95	30	64.6	8.22	
Watertown				1.90	
Wauneta				1.85	
Weeping Water				3.86	
Westpoint	97	33	66.6	5.53	
Wilber				4.95	
Winnebago	93	26	64.9	5.27	
Wisner				8.40	
Wymore				3.00	
York	97	33	67.4	2.63	
Nevada.					
Amos	89	27	58.7	0.58	
Austin	81	31	59.6	0.60	
Battle Mountain	95	38	64.4	0.00	
Carson City	86	30	59.0	0.19	
Carson Dam	89	38	63.9	0.36	
Columbia	87	33	64.4	0.03	
Dyer	85	28	58.0	0.00	
Elko[4]	90	36	61.8	0.34	
Ely	87	29	57.0	0.73	
Eureka	84	27	59.2	0.53	
Fallon	90	34	62.8	0.29	
Gardnerville	88	33	58.6	0.03	
Geyser	84	22	53.2	0.60	
Golconda	87	30	61.0	0.20	
Halleck[4]				0.20	
Hamilton	81	23	54.4	0.76	T.
Hazen	96	37	66.5	0.38	
Humboldt	87	35	62.4	T.	T.
Leetville	91	40	65.9	0.26	
Lewers Ranch	82	33	59.3	0.38	
Logan	103	49	77.6	0.34	
Mill City[4]	86	41	55.0	0.00	
Mina	92	40	64.9	0.20	
Morey	83	29	58.6	0.17	T.
Palisade	94	28	58.4	0.30	
Palmetto	80	23	56.5	T.	T.
Paradise Valley				0.10	
Pioche	93	37	64.0	0.63	
Potts	87	20	52.6	0.15	
San Jacinto	88	19	57.0	0.30	
Soda Lake	100	39	66.3	0.05	
Squaw Valley	88	18	55.4	1.12	
Stillwater	86	31	58.2	0.74	
Tecoma	89	27	58.4	0.69	
Wabuska	88	31	58.0	0.30	
Wadsworth	85	37	61.2	0.02	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nevada—Cont'd.	°	°	°	*Ins.*	*Ins.*
Wells[4]	84	26	56.1	0.00	
Wood	86	28	57.0	0.25	
New Hampshire.					
Alstead	84	33	61.1	1.80	
Bartlett				1.91	
Bethlehem	82	27	58.2	2.15	
Bretton Woods				3.03	
Brookline	90	31	64.0	1.00	
Durham	90	29	61.8	1.14	
Franklin Falls	93	28	62.4	0.94	
Grafton	90	24	59.2	0.71	
Groveton				2.94	
Hanover	90	29	61.0	1.54	
Keene	92	28	61.6	1.44	
Nashua	93	32	54.0	0.84	
Newton	89	28	60.0	0.95	
North Woodstock				2.30	
Plymouth	89	26	59.6	1.50	
New Jersey.					
Asbury Park	89	56	71.1	0.75	
Bayonne	94	46	69.1	3.07	
Belvidere	91	40	68.0	2.54	
Bergen Point	91	48	69.0	3.00	
Beverly	91	46	69.9	2.52	
Bridgeton	92	47	70.9	0.91	
Browns Mills	91	45	68.4	2.68	
Canton				2.00	
Cape May C. H.	88	47	70.2	2.46	
Charlotteburg	89	34	66.3	2.57	
Clayton	90	47	70.1	1.93	
College Farm	92	44	68.6	1.93	
Dover	92	37	64.8	1.88	
Elizabeth	91	49	70.0	2.12	
Englewood	88	45	66.8	2.57	
Flemington	93	44	69.1	2.79	
Friesburg	91	48	70.5	1.63	
Hightstown	90	44	67.8	1.07	
Imlaystown	91	43	69.4	1.27	
Indian Mills	93	45	70.0	0.92	
Jersey City	93	50	70.4	2.81	
Lakewood	89	46	68.6	0.86	
Lambertville	90	42	69.6	1.14	
Layton	90	33	64.2	1.62	
Moorestown	89	45	69.2	3.99	
Newark	92	45	69.3	3.54	
New Brunswick	91	44	69.0	3.05	
Newton	92	36	66.4	2.51	
Oceanic	88	52	69.5	1.84	
Paterson	94	44	69.5	1.82	
Phillipsburg	91	43	69.1	2.36	
Plainfield	91	44	68.0	2.82	
Pleasantville				2.73	
Rancocas				4.66	
Sandy Hook	91	58	71.4	1.73	
Somerville	94	42	69.2	2.33	
South Orange	87	46	66.8	4.22	
Sussex	88	40	66.3	2.31	
Toms River	93	40	69.0	2.91	
Trenton	88	48	69.5	0.89	
Tuckerton	91	44	69.2	2.07	
Vineland	91	46	70.2	1.23	
Woodbine	91	45	70.1	1.06	
New Mexico.					
Alamagordo	93	50	72.0	0.42	
Albert	95	48	68.9	2.59	
Albuquerque	90	46	68.8	1.80	
Alto				2.13	
Aragon	89	37	62.8	1.56	
Artesia	97	42	71.2	0.00	
Bellranch	95	46	69.2	2.77	
Bloomfield	96	38	54.2	1.33	
Cambray				1.39	
Carlsbad	99	50	74.8	1.37	
Chama	81	30	54.6	1.85	
Cloudcroft	72	34	51.2	5.44	
Datil	89	36	59.0		
Deming	93	45	70.6	0.64	
Dorsey	85	38	61.4	2.93	
Dulce	87	29	56.8	1.72	
Eagle Rock Ranch	82	37	58.5	4.75	
Elizabethtown	72	25	49.8	1.69	
Elk	87	45	63.7	4.82	
Estancia	88	35	60.4	1.49	
Fairview	87	35	61.7	1.31	
Fort Bayard	88	43	66.0	0.86	
Fort Stanton	84	38	61.0	1.95	
Fort Union	82	33	57.2	3.01	
Fort Wingate	83	33	59.3	2.40	
Fruitland	88	38	60.9	1.47	
Gage				0.84	
Glen	97	45	71.2	1.18	
Hillsboro				1.79	
Hope				0.87	
Laguna	88	36	63.6	2.96	
Lagunita	92	44	66.6	3.69	
Lake Valley				0.46	
Las Vegas	89	38	61.3	1.86	
Lordsburg	95	54	73.9	0.02	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Los Alamos				2.46	
Los Lunas	90	44	65.4	2.18	
Luna	79	29	55.6	2.39	
Magdalena	85	35	62.0	2.02	
Manuelito				1.77	
Mesilla Park	96	46	72.5	0.31	
Mimbres				1.31	
Mineral Hill				2.15	
Monument	95	50	72.2	0.08	
Mountain Air	88	36	63.3	1.43	
Nara Visa	92	45	68.6	1.87	
Orange	95	48	70.3	1.16	
Palma				0.04	
Portales	94	50	70.2	2.73	
Red River	80	34	55.8	1.50	
Redrock				0.42	
Rincon	95	47	70.6	2.00	
Rociada	78	29	54.4	2.80	
Rosa				1.25	
Rosedale	80	44	61.0	1.84	
San Rafael	89	40	63.0	2.58	
Socorro	97	36	69.2	0.72	
Springer	89	37	61.7	2.69	
Strauss				0.35	
Taos	90	34	60.6	1.25	
Tres Piedras	80	29	54.8	1.42	
Tucumcari	94	50	70.5	0.33	
Valley				1.44	
Vermejo	74	29	52.3	1.24	T.
Whiteoaks				1.51	
New York.					
Adams	92	40	66.6	6.05	
Addison	94	35	65.6	2.30	
Akron				2.62	
Amsterdam	89	34	63.8	2.70	
Angelica	84	34	61.0	3.63	
Appleton	90	37	66.2	2.25	
Arcade	89	32	60.1	2.35	
Athens	90	39	65.8	2.70	
Atlanta	89	35	63.5	3.46	
Atwater				2.33	
Auburn	90	38	65.6	2.92	
Avon	87	37	65.2	4.34	
Baldwinsville	88	39	66.9	2.12	
Ballston Lake	88	33	63.4	1.61	
Bedford	91	40	66.4	3.23	
Berlin	84	31	61.5	3.12	
Blue Mountain Lake				4.11	
Bolivar	90	32	62.4	5.23	
Bouckville	87	25	58.3	3.28	
Brockport	91	41	67.0	2.25	
Cape Vincent	84	41	64.4	3.10	
Carmel	91	38	65.4	2.92	
Carvers Falls	86	34	61.7	1.63	
Chatham	90	36	65.0	2.94	
Chazy	85	31	61.2	3.27	
Coeymans	91	39	67.6	2.80	
Cold Spring Harbor	92	40	67.8	1.35	
Cooperstown	83	33	61.3	2.28	
Cortland	87	30	62.3	2.20	
Cutchogue	90	46	67.0	2.38	
Dannemora	84	35	60.6	3.02	
Dekaib	89	33	63.0	3.86	
De Ruyter	91	32	62.7	2.47	
Easton				2.09	
Elba	93	40	66.4	5.45	
Elmira	102	35	68.4	5.99	
Fayetteville	94	38	66.4	1.96	
Fort Plain	89	32	65.1	2.86	
Franklinville	88	33	62.0	4.32	
Gabriels	87	26	57.6	2.69	
Gansevoort				2.29	
Glens Falls	92	34	63.4	2.62	
Gloversville	88	31	61.7	3.56	
Greenfield	89	34	63.0	3.05	
Greenwich	87	33	63.6	2.40	
Griffin Corners	87	27	61.6	2.67	
Harkness	89	34	61.0	2.11	
Haskinville				2.86	
Hemlock	85	42	65.2	2.89	
Hunt	89	35	63.0	3.03	
Indian Lake	88	27	59.1	3.15	
Ithaca	89	36	64.4	1.83	
Jamestown	89	39	65.9	4.30	
Jeffersonville	91	31	62.4	3.76	
Keene Valley	90	27	58.9	2.75	
Lake George	84	34	62.7	1.69	
Le Roy	88	40	65.6	5.63	
Liberty	87	36	61.2	3.91	
Littlefalls, City Res.	86	35	62.8	3.28	
Lockport	88	38	66.4	2.60	
Lowville	88	30	61.6	3.55	
Lyndonville				2.13	
Lyons	92	41	67.4	1.16	
Middletown	89	42	66.0	2.74	
Mohonk Lake	85	41	63.8	3.20	
Moira	89	36	62.4	3.93	
Mount Hope	92	37	66.4	2.50	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Newark Valley				1.43	
New Lisbon	85	29	59.2	2.35	
North Hammond	89	32	64.3	2.34	
North Lake	83	32	59.8	3.40	
Norwich	86	35	64.3	4.11	
Ogdensburg	86	35	63.5	2.98	
Oneonta	92	35	65.8	1.79	
Oswegatchie	88	30	59.6	2.60	
Otto	87	42	66.0	2.90	
Oxford	86	34	63.4	2.24	
Oyster Bay	89	53	70.2	1.24	
Palermo				0.79	
Perry City	90	29	62.4	2.02	
Plattsburg	81	39	62.7	2.34	
Port Jervis	94	37	66.8	2.22	
Potsdam	89	33	62.8	5.53	
Ridgeway	90	41	66.7	2.41	
Romulus	90	39	65.8	1.53	
Saranac	85	28	58.2	3.57	
Scarsdale	86	39	64.5	2.20	
Scottsville				3.87	
Shortsville	89	38	66.2	3.00	
Skaneateles				2.46	
Southampton	85	42	66.6	0.96	
South Canisteo	90	34	63.6	3.32	
South Schroon	87	29	59.6	2.39	
Spier Falls	91	33	63.5	2.20	
Taberg	92	35	64.4	2.33	
Ticonderoga	89	35	64.9	1.10	
Volusia	85	42	65.2	2.25	
Wappinger Falls	89	42	65.8	3.00	
Warwick				1.81	
Watertown	87	37	63.8	6.27	
Waverly	92	31	64.4	2.33	
Wedgwood	90	37	64.9	2.17	
West Berne	89	30	62.8	2.12	
Westfield	85	40	66.4	2.48	
Windham	86	31	61.2	2.28	
Youngstown				2.48	
North Carolina.					
Battleboro				3.59	
Beaufort	93	68	79.2	5.69	
Brevard	88	48	70.0	14.71	
Brewers	89[f]	52[e]	71.5[e]	5.46	
Bryson City				5.91	
Buck Springs	78	35	61.5	19.62	
Caroleen	91	58	74.8	6.04	
Chalybeate Springs	93	56	76.2	2.60	
Eagletown	93	56	75.6	1.65	
Edenton	90	56	75.0	2.46	
Fayetteville	91	58	74.6	2.22	
Goldsboro	90	58	75.2	2.43	
Graham				1.37	
Greensboro	92	54	74.0	0.94	
Greenville				3.29	
Henderson	89	53	73.8	2.04	
Horse Cove	84	55	67.8	22.46	
Hot Springs	90	62	76.6		
Kinston	96	57	78.0	0.59	
Lenoir	92	55	75.7	7.19	
Lexington	92	57	74.5	2.63	
Lincolnton	91	57	72.7		
Linville	78	40	62.2	16.02	
Louisburg	90	56	74.4	2.24	
Lumberton	95	58	77.5	2.91	
Moncure	93	55	75.2	3.60	
Monroe	92	53	74.1	3.40	
Morganton	89	50	71.6	3.86	
Mountairy	92	50	72.0	4.05	
Mount Holly				4.66	
Murphy				7.43	
Nashville	97	54	75.8	1.84	
Newbern	95	60	77.4	2.57	
Patterson	86	52	68.9	4.79	
Pinehurst	99	61	77.2	0.72	
Pink Beds	79	40	63.2	17.43	
Randleman				2.09	
Reidsville	94	53	74.6	1.50	
Rockingham	94	56	75.8	2.85	
Salem	91	54	73.0	2.67	
Salisbury	94	58	74.2	3.00	
Saxon	90	53	70.9	2.18	
Scotland Neck	92	56	76.0	2.04	
Settle	89[f]	54[f]	73.3[f]	2.55	
Sloan	99	58	76.8	4.87	
Snowhill	94	57	76.5	3.24	
Southern Pines	94	60	76.2	1.53	
Southport	92	61	79.3	3.54	
Statesville	91	51	73.2	3.61	
Tarboro	97	56	77.5	2.45	
Vade Mecum	98	45	69.4	3.57	
Washington	95	58	77.6	1.83	
Waynesville	83	47	68.3	5.82	
Weldon	95	55	76.2	2.19	
North Dakota.					
Amenia	98	32	62.4	1.35	
Beach	99	30	61.3	2.08	
Berlin	97	32	62.0	2.85	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Bottineau	101	29	61.8	1.47	
Broncho	99			0.27	
Buford	96	32	61.9	1.87	
Cando	100[e]	25[e]	61.4[e]	0.76	
Coalharbor	101	31	63.0	0.39	
Cooperstown	102	27	63.2	1.28	
Denbigh	103	34	65.2		
Dickinson	99	30	61.2	0.25	
Donnybrook	100	26	60.8	0.80	
Dunseith	101	28	61.0	0.80	
Edgeley	97	34	64.8	1.45	
Edmore	102	29	61.6	1.10	
Ellendale	104	37	67.4	1.90	
Fargo	95	37	63.8	1.18	
Forman	98	37	64.6	3.19	
Fort Yates	102	35	65.1	1.26	
Fullerton	99	31	62.5	2.89	
Glenullin	100[e]	31[e]	62.6[e]	0.25	
Grafton	103	32	63.2	0.78	
Hannah	102	23	62.1	1.00	
Hillsboro	98	33	64.4	1.76	
Jamestown	100	33	63.9	1.12	
Kulm	98	32	63.0	1.52	
Lakota	101	27	61.6	0.43	
Lamour				1.44	
Larimore	109	32	62.5	1.90	
Liabon	94	32	61.5	1.80	
McKinney	103	22	60.0	0.62	
Manfred	100	34	62.0	0.45	
Medora	103[f]	28[f]	59.9[f]	1.35	
Melville	107[e]	38[e]	66.2[e]	0.49	
Minot	101	27	61.7	0.53	
Moyersville	100	26	61.2	0.57	
Napoleon	104	27	61.9	0.68	
New England	98	32	66.0	0.01	
Oakdale	98	35	63.6	1.03	
Oriska	99	33	63.0	2.04	
Palermo	96				
Park River	104	33	64.3	1.10	
Pembina	101	29	60.9	1.12	
Portal	97	23	58.3	0.78	
Power	96	33	63.4	2.50	
Pratt	102	20	61.5	0.45	
Steele	103[e]	34[e]	64.8[e]	1.00	
University	99	30	62.8	1.61	
Walhalla	104	32	62.4	1.10	
Willow City	101	26	60.2	0.93	
Wishek	98	30	61.2	1.60	
Ohio.					
Akron	90	44	68.7	2.98	
Amesville	94	42	71.2	2.71	
Atwater	86	46	67.4	4.03	
Bangorville	92	43	68.8	2.57	
Bellefontaine	94	46	68.6	1.59	
Benton Ridge	90[d]	43[d]	68.5[d]	1.61	
Bladensburg	88	40	66.2	3.54	
Bowling Green	92	41	67.7	4.04	
Bucyrus	89	42	67.4	3.49	
Cadiz	91	45	69.2	3.32	
Cambridge	91	45	69.8	4.54	
Camp Dennison	93	48	71.5	4.58	
Canal Dover	88	40	66.3	2.72	
Canton	87	44	66.8	3.45	
Cardington	92	39	68.0	2.40	
Circleville	90	45	69.8	3.31	
Clarington	95	47	71.6	2.31	
Clarksville	91	49	71.2	3.62	
Cleveland *b*	87	48	67.2	2.63	
Coalton	93	45	71.0	2.52	
Dayton	94	44	70.8	2.89	
Defiance	94	40	68.0	2.42	
Delaware	91	43	68.6	2.58	
Demos	90	45	69.3	3.66	
Findlay	96	44	70.7	2.03	
Frankfort	87	43	68.4	2.05	
Fremont	92	45	69.8	3.40	
Garrettsville	89	38	65.4	6.22	
Gratiot	88	43	67.3	2.57	
Green	97	50	71.4	3.63	
Greenhill	90	42	65.7	3.19	
Greenville	90	45	68.4	1.92	
Hedges	91	39	68.2	1.54	
Hillhouse	88	40	67.2	4.25	
Hiram	86	42	66.4	6.23	
Hudson	92	38	66.3	6.82	
Ironton	91	50	73.5	4.59	
Jacksonburg	92	47	72.0	2.96	
Kenton	94	41	67.5	2.33	
Lancaster	88	45	69.5	1.68	
Lima	89	44	67.5	0.48	
McConnelsville	92	44	69.4	4.02	
Manara	96	43	67.9	1.77	
Mansfield				6.00	
Marietta	89	50	71.4	2.57	
Marion	98	42	70.2	2.27	
Medina	94	42	68.4	3.48	
Milfordton	91	42	67.0	3.20	
Milligan	92	39	68.8	1.93	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Millport	88	40	66.3	2.55	
Napoleon	91	44	69.2	1.80	
Nellie	87	46	68.6	3.95	
New Alexandria	94	45	69.0	3.60	
New Berlin	90	42	67.4	3.92	
New Bremen	93	41	69.4	1.59	
New Richmond	91	48	71.6	3.25	
New Waterford	91	39	66.2	2.89	
North Lewisburg	92	41	68.2	3.05	
Norwalk	91	41	68.2	1.71	
Oberlin	93	40	68.0	2.59	
Orangeville	90	37	64.6	2.54	
Ottawa	95	43	69.4	3.84	
Pataskala	88	46	68.6	2.69	
Philo	93	46	71.2	2.02	
Plattsburg	89	44	69.0	2.41	
Pomeroy	90	49	70.6	1.98	
Portsmouth	88	51	71.5	3.59	
Pulse	87	49	70.7	4.09	
Rittman	95	40	67.8	2.61	
Rockyridge	94	47	69.2	2.50	
Shenandoah	91	41	67.3	3.23	
Sidney	93	44	70.4	1.47	
Somerset	90	47	69.8	1.89	
South Lorain	91	36	67.4	2.51	
Springfield				2.82	
Thurman	93	49	72.0	1.40	
Tiffin	88	45	68.0	2.15	
Toledo (St. Johns College)	90	45	68.4	1.10	
Upper Sandusky	91	42	69.4	2.81	
Urbana	91	41	68.2	1.92	
Vickery	93	40	67.8	2.90	
Warren	92	39	67.4	3.54	
Wauseon	93	41	67.2	2.81	
Waverly	92	46	71.8	2.55	
Waynesville	88	47	69.3	3.10	
Wellington	91[e]	41	68.8	2.27	
Willoughby				1.91	
Wilson	92	45	71.0	4.05	
Wooster	90	44	67.7	5.16	
Zanesville				2.55	
Oklahoma.					
Alva	92	44	72.6	2.77	
Arapaho	93	44	73.3	4.56	
Beaver	95	39[e]	72.4[e]	5.14	
Cache				4.25	
Chandler	97	48	76.6	1.64	
Chattanooga	92	49	76.6	5.21	
Cloud Chief	93	44	72.0	3.70	
Dacoma	93	45	72.4	2.45	
Enid	95	44	73.2	4.09	
Erick	97	55	74.8	4.17	
Fort Reno	92[d]	38[d]	70.4[d]	2.20	
Fort Sill	92	49	74.6	5.40	
Gage	93	42	71.4	2.95	
Grande	95	41	72.1	2.55	
Guthrie	92	48	74.8	4.84	
Harrington	85	38	70.6	3.25	
Hennessey	93	44	73.9	5.08	
Hobart	93	48	73.4	6.82	
Hooker	94	49	70.3	4.15	
Jefferson	96[b]	42[b]		3.05	
Kenton	92	44	66.4	3.32	
Kingfisher	94	48	74.4	4.49	
McComb	90	54	74.2	7.60	
Mangum	96	52	74.3	4.90	
Meeker	93	48	74.6	2.80	
Neola	91	45	72.6	3.25	
Newkirk	94	44	75.3	3.69	
Norman				6.09	
Okeene	92	42	73.0	3.33	
Pawhuska	93	53	75.3	4.89	
Perry	93	44	74.0	5.82	
Sac and Fox Agency	90	48	74.8	2.15	
Shawnee	92	48	75.1	3.86	
Stillwater	91	47	73.6	9.00	
Taloga	92[e]	36[b]	71.4[e]	3.06	
Temple	96	46	75.7	3.48	
Waukomis	94	47	74.0	4.45	
Weatherford	93	43	73.0	3.38	
Whiteagle	93	43	74.4	2.45	
Oregon.					
Albany	88	38	60.4	1.98	
Alpha	91			4.43	
Ashland				1.42	
Astoria	71	45	59.3	8.66	
Aurora (near)	82	38	60.0	2.87	
Bay City	73	38	56.2	7.97	
Bend	91	23	56.9	0.31	
Beulah	92	22	54.0	0.60	
Blackbutte	84	34	58.6	2.75	
Blalock	99	43	69.6	0.43	
Bullrun	84	38	60.2	5.80	
Burns	87	26	56.6	0.59	
Cascade Locks	84	40	62.0	4.84	
Corvallis	87	38	61.0	2.24	
Dale				1.22	
Dayville	95	31	62.7	0.62	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Doraville	81	39	58.2	3.38	
Drain	93	32	62.0	2.79	
Echo	94	35	65.1	0.78	
Ella	95	36	65.6	0.46	
Eugene	83	39	60.2	2.49	
Fairview	89	38	59.4	2.41	
Falls City	77	36	57.8	2.57	
Forestgrove	91	32	58.7	1.81	
Gardiner	81	45	59.3	3.63	
Glendale	95	32	61.0	.....	
Glenora	85	34	58.4	9.31	
Gold Beach	77	38	56.2	4.16	
Government Camp	82	28	53.4	5.86	
Granite	88	20	54.2	0.91	
Grants Pass	96	33	63.4	1.05	
Grass Valley	91	26	59.0	0.35	
Heisler	96	28	60.2	0.33	
Heppner	94	38	62.0	0.86	
Hermiston	.....	.....	.....	0.58	
Hood River	86	37	62.2	1.49	
Huntington	92	39	64.8	0.40	
Jacksonville	95	38	64.4	2.30	
Joseph	36	30	57.4	0.83	
Kerby	96	34	61.6	1.08	
Klamath Falls	90	32	61.4	0.23	
Lagrande	94	29	60.2	1.23	
Lakeview	88	27	57.6	0.82	
Lost River	89	26	57.0	0.82	
McKenzie Bridge	95	28	59.2	4.08	
Marshfield	77	40	58.2	3.00	
Mill City	87	30	57.0	2.20	
Monroe	86	40	60.4	1.47	
Mountain Park	87	34	59.0	2.63	
Mount Angel	88	42	63.2	1.52	
Nehalem	.....	.....	.....	10.72	
Newport	71	44	56.3	3.43	
Odell	.....	.....	.....	0.42	
Olex	93	38	63.3	0.40	
Ontario	.....	.....	.....	0.30	
Paisley	86	30	58.6	0.15	
Pendleton	95	33	61.8	1.15	
Port Oxford	71	48	56.6	4.83	
Prineville	89	27	58.7	0.55	
Prospect	92	20	56.6	1.40	
Salem	84	43	61.9	1.92	
Sparta	85	29	57.6	0.20	
The Dalles	90	37	62.4	0.35	
Toledo	80	34	58.2	4.12	
Umatilla	100	39	68.6	0.55	
Van	.....	.....	.....	0.45	
Wallowa	93	24	56.9	0.55	
Warm Spring	95	31	61.4	0.14	
Weston	94	28	59.4	1.38	
Williams	95	30	61.5	1.14	
Pennsylvania.					
Aleppo	91	42	68.4	2.56	
Altoona	88	39	65.0	1.68	
Baldwin	89	42	66.2	2.75	
Beaver Dam	.....	.....	.....	3.90	
Brower	.....	.....	.....	1.45	
California	92	45	70.1	1.58	
Cassandra	85	40	63.6	1.35	
Centerhall	87	37	62.4	2.60	
Clarion	.....	.....	.....	3.78	
Claysville	93	41	68.0	3.14	
Coatsville	93	43	70.0	0.71	
Confluence	.....	.....	.....	3.34	
Davis Island Dam	.....	.....	.....	3.60	
Derry	93	40	68.6	1.83	
Doylestown	.....	.....	.....	2.55	
Dushore	87	31	61.4	1.12	
East Mauch Chunk	92	36	67.6	2.79	
Easton	86	44	68.0	2.39	
Ellwood Junction	.....	.....	.....	3.17	
Emporium	86	38	63.4	2.63	
Ephrata	94	42	69.3	2.04	
Everett	89[f]	38[f]	66.4[f]	1.56	
Forks of Neshaminy	.....	.....	.....	0.61	
Franklin	90	37	65.4	4.20	
Freeport	94	42	68.5	3.13	
Gettysburg	91	41	69.2	1.33	
Girardville	.....	.....	.....	4.31	
Gordon	88	35	65.4	3.69	
Greensboro	.....	.....	.....	1.80	
Greenville	91	39	66.3	3.69	
Hamburg	90	42	68.2	4.88	
Hanover	94	43	71.9	1.34	
Herrs Island Dam	.....	.....	.....	3.24	
Huntingdon	91	39	67.0	1.65	
Hyndman	91	39	67.1	1.18	
Indiana	90	42	67.5	4.08	
Irwin	99	41	69.7	2.83	
Johnstown	93	44	69.0	1.71	
Keating	.....	.....	.....	2.79	
Kennett	87	45	68.7	1.07	
Lansdale	.....	.....	.....	2.69	
Lawrenceville	94	37	64.2	2.94	
Lebanon	93	40	69.6	1.48	
Leroy	86	36	64.6	1.61	
Lewisburg	91	38	67.6	2.97	
Lockhaven	93	40	68.0	2.32	
Lock No. 4	.....	.....	.....	1.64	
Lycippus	89	44	68.6	2.14	
Marion	89	42	67.8	0.66	
Mifflintown	89	38	66.8	1.99	
Milford	93	33	64.8	1.54	
Montrose	90	35	64.1	2.39	
New Germantown	91	39	67.2	1.11	
Ottsville	.....	.....	.....	1.23	
Philadelphia	90	50	71.0	0.42	
Pocono Lake	82	30	60.6	2.30	
Point Pleasant	.....	.....	.....	1.12	
Pottsville	.....	.....	.....	4.37	
Reading	91	41	69.7	2.84	
Renovo	.....	.....	.....	2.26	
Saegerstown	88	34	64.4	6.57	
St. Marys	87	56	62.4	3.51	
Saltsburg	.....	.....	.....	2.64	
Seisholtzville	.....	.....	.....	1.30	
Selinsgrove	90	39	68.0	2.15	
Shawmont	.....	.....	.....	0.44	
Skidmore[f]	90	42	66.6	.....	
Smiths Corners	.....	.....	.....	0.92	
South Eaton	88	37	65.4	2.63	
Springdale	.....	.....	.....	5.25	
Springmount	.....	.....	.....	3.48	
State College	86	40	65.2	2.69	
Towanda	91	36	64.6	2.30	
Troutrun	.....	.....	.....	3.94	
Uniontown	89	48	69.0	2.69	
Warren	96	38	66.4	4.74	
Wellsboro	89	32	62.8	3.04	
Westchester	92	46	70.4	1.34	
West Newton	.....	.....	.....	1.84	
Whitehaven	86	39	63.8	3.24	
Wilkesbarre	90	40	66.4	3.33	
Williamsport	88	41	67.2	3.42	
Rhode Island.					
Bristol	80	44	64.4	2.38	
Kingston	90	39	63.5	4.28	
Pawtucket	.....	.....	.....	3.94	
South Carolina.					
Aiken	94	66	78.8	4.05	
Allendale	95	63	79.6	2.55	
Anderson	92	59	75.9	5.78	
Batesburg	95	60	77.2	4.86	
Beaufort	94	64	79.0	2.53	
Bennettsville	96	62	78.0	2.65	
Blackville	98	62	80.5	2.65	
Blairs	.....	.....	.....	3.72	
Bowman	96	61	78.9	3.46	
Calhoun Falls	.....	.....	.....	9.04	
Camden	93	61	77.0	4.40	
Catawba	.....	.....	.....	2.57	
Chappells	.....	.....	.....	5.04	
Cheraw	91	63	76.2	3.28	
Clemson College	88	60	75.5	8.82	
Conway	95	62	78.2	3.39	
Dillon	96	60	78.0	3.09	
Due West	90	62	75.5	4.53	
Edisto	.....	.....	.....	1.43	
Effingham	.....	.....	.....	3.95	
Enoree	.....	.....	.....	4.59	
Florence	95	62	78.1	2.41	
Georgetown	90	67	78.1	3.93	
Greenville	90	55	72.0	10.35	
Greenwood	90	62	75.2	5.15	
Heath Springs	94	60	75.0	5.03	
Kingstree	94	66	79.0	5.60	
Liberty	90	58	74.4	6.71	
Little Mountain	92	63	76.5	5.48	
Newberry	93	60	77.1	4.94	
Pelzer	.....	.....	.....	5.65	
Pinopolis	90	68	77.8	5.16	
St. Georges	92	63	78.6	2.70	
St. Matthews	89	64	76.6	5.05	
St. Stephens	.....	.....	.....	4.75	
Saluda	94	58	76.9	4.26	
Santuck	91	58	75.2	4.02	
Smiths Mills	.....	.....	.....	5.79	
Society Hill	91	63	76.7	4.03	
Spartanburg	93	58	73.4	5.97	
Stateburg	90	65	77.8	7.19	
Summerville	95	61	78.7	4.78	
Sumter	97	60	79.3	4.13	
Trenton	94	62	76.6	4.72	
Trial	95	62	78.4	5.41	
Walhalla	92	60	75.6	14.37	
Walterboro	92	60	78.6	2.68	
Winnsboro	93	64	76.1	2.55	
Winthrop College	91	57	75.4	4.57	
Yemassee	91	62	77.2	3.46	
South Dakota.					
Aberdeen	99	34	64.0	2.40	
Academy	95	38	64.4	2.92	
Alexandria	96	35	62.4	5.36	
Armour	101	34	64.6	3.18	
Ashcroft	99	32	63.4	1.33	
Bowdle	96	31	63.2	1.26	
Brookings	93	31	62.2	5.13	
Canton	94	31	64.0	4.89	
Castlewood	95	31	62.4	2.57	
Centerville	94	33	64.0	6.00	
Chamberlain	102	39	66.1	2.41	
Cherry Creek	103	34	65.0	2.71	
Clark	95	33	62.4	3.40	
Clear Lake	91	35	62.1	4.31	
Desmet	91	32	63.4	4.20	
Doland	95	34	63.6	3.73	
Elkpoint	100	33	66.4	12.18	
Fairfax	97	34	66.6	3.01	
Farmingdale	.....	.....	.....	2.60	
Faulkton	93	34	62.2	2.18	
Flandreau	94	35	63.0	4.03	
Forestburg	94	31	62.4	4.64	
Fort Meade	95	41	65.6	0.12	
Gannvalley	98	36	64.1	2.20	
Greenwood	100	37	66.0	3.46	
Hermosa	96	39	62.7	2.04	
Highmore	99	35	64.1	2.81	
Howard	93	36	62.2	6.18	
Howell	95	35	63.0	2.89	
Ipswich	96	33	63.0	2.06	
Kennebec	103	31	64.8	2.84	
Kidder	94	30	63.2	3.50	
Kimball	94	37	63.6	2.39	
Leola	95	30	61.5	1.35	
Little Eagle	102	34	64.3	1.36	
Marion	99[e]	37	66.0	8.78	
Mellette	98	32	63.6	2.89	
Menno	96	38	64.3	4.67	
Milbank	98	33	64.2	2.38	
Mitchell	98	36	64.3	4.69	
Oelrichs	98	35	62.1	3.33	
Orman	99[e]	34[e]	63.0[e]	1.28	
Pine Ridge	98	29	60.8	2.93	
Plankinton	91	36	63.2	3.59	
Ramsey	94	34	63.4	5.55	
Redfield	95	35	62.6	2.32	
Roslyn	93	37	62.8	2.39	
Rousseau	.....	.....	.....	2.85	
Sioux Falls	97	35	64.6	5.49	
Spearfish	92	29	59.6	1.06	
Stephan	97	36	62.7	3.01	
Tyndall	98	37	66.8	3.93	
Watertown	88	34	60.8	1.25	
Wentworth	94	36	63.8	4.83	
Woolsey	.....	.....	.....	3.11	
Tennessee.					
Andersonville	88	57	73.8	4.70	
Arlington	93	61	75.4	6.23	
Ashwood	90	57	74.6	11.03	
Benton	91	60	76.6	4.89	
Bluff City	.....	.....	.....	2.78	
Bolivar	91	56	74.8	7.09	
Bristol	90	55	72.6	3.73	
Brownsville	91	62	75.6	5.87	
Byrdstown	90	55	74.2	7.84	
Carthage	92	55	75.4	10.48	
Cedar Hill	98	58	77.1	10.63	
Celina	.....	.....	.....	7.92	
Charleston	.....	.....	.....	5.18	
Clarksville	92	60	74.9	8.55	
Clinton	.....	.....	.....	2.99	
Covington	91	63	76.3	10.15	
Decatur	91	58	75.2	9.18	
Dover	96	57	77.0	7.56	
Dyersburg	90	64	75.6	6.21	
Elizabethton	89	53	71.4	3.42	
Erasmus	88	50	70.9	8.22	
Florence	90	58	75.0	8.41	
Franklin	91	58	75.2	10.02	
Greeneville	89	54	72.1	2.55	
Halls Hill	.....	.....	.....	6.57	
Harriman	88	58	73.9	4.90	
Hohenwald	90	51	72.8	7.47	
Iron City	94	60	76.4	6.70	
Johnsonville	95	55	76.2	5.58	
Jonesboro	87	50	71.2	1.85	
Kenton	96	58	76.8	5.20	
Kingston	.....	.....	.....	4.06	
Lafayette	90	56	74.3	12.97	
Leadvale	.....	.....	.....	1.10	
Lewisburg	94	57	76.2	8.87	
Loudon	.....	.....	.....	6.60	
Lynnville	89	59	75.2	10.44	
McGee	.....	.....	.....	5.19	
McMinnville	91	55	74.2	5.77	
Maryville	90	60	74.6	4.63	
Milan	93	58	75.4	6.08	
Monterey	86	58	71.5	5.98	
Newport	87	58	73.2	3.39	
Palmetto	92	58	75.4	9.52	
Pinewood	93	55	76.2	6.96	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Tennessee—Cont'd.	°	°	°	*Ins.*	*Ins.*
Pope	94	54	75.8	4.10	
Rogersville	91	56	73.4	4.69	
Rugby	87	51	71.8	6.70	
Savannah	91	61[f]	76.0[g]	5.31	
Sevierville	91	59	75.3	4.37	
Sewanee	85	61	71.6	7.88	
Silver Lake	81	47	67.0	4.26	
Sparta	90	56	74.2	2.41	
Springdale	91	54	75.1	5.58	
Springville	92	54	75.8	5.77	
Tazewell	...	...	.....	4.28	
Tellico Plains	90	59	75.1	6.35	
Tracy City	85[e]	53[e]	70.4[e]	6.74	
Trenton	94	56	76.3	5.08	
Tullahoma	90	58	74.4	7.95	
Union City	91	57	75.0	7.92	
Walling	...	...	.....	7.69	
Watertown	96	53	77.0	7.75	
Waynesboro	89	58	75.1	6.01	
Wildersville	88	60[h]	75.0[d]	5.38	
Yukon	90	62	74.8	11.40	
Texas.					
Albany	96	50	75.2	5.84	
Alvin	...	...	.....	3.47	
Arthur	...	...	.....	6.28	
Austin	96	66	80.8	2.37	
Ballinger	97	54	77.0	4.11	
Barstow	98	52	76.4	0.54	
Beaumont	...	...	.....	3.36	
Beeville	99	64	81.6	2.33	
Big Springs	93	51	74.9	0.84	
Blanco	95	59	76.8	2.33	
Boerne	95	50	77.0	5.60	
Booth	...	...	.....	5.26	
Bowie	98	47	77.2	2.46	
Brazoria	91	63	79.4	2.13	
Brenham	96	63	80.1	3.18	
Brighton	94	69	83.0	1.29	
Channing	94	43	70.1	2.57	
Childress	94	45	72.4	6.25	
Chillicothe	...	...	.....	5.02	
Claude	95	50	70.0	3.00	
Claytonville	96	40	79.5	2.61	
College	99	65	80.6	2.93	
Coleman	88	54	74.9	0.70	
Colorado	94	46	73.7	2.95	
Columbus	...	...	.....	4.31	
Corsicana	97	56	79.7	2.53	
Crockett	98	59	80.4	5.73	
Cuero	98	66	82.0	1.88	
Dallas	95	56	77.7	3.46	
Danevang	96	55	81.0	4.72	
Denison	...	...	.....	0.94	
Dialville	92[e]	61[c]	77.8[e]	5.04	
Duval	95	62	79.2	2.06	
Fort Brown	95	70	83.4	1.01	
Fort Clark	92	59	76.9	2.55	
Fort Davis	91	46	67.8	1.17	
Fort McIntosh	102	58	82.7	2.58	
Fort Stockton	...	...	.....	1.27	
Fredericksburg	94	51	76.2	2.71	
Gainesville	94	51	75.4	6.88	
Gatesville	98	55	78.4	4.50	
Georgetown	96	55	79.2	2.51	
Gonzales	...	...	.....	0.60	
Grapevine	97[e]	56[e]	78.0[e]	7.14	
Greenville	98	57	79.4	4.46	
Hale Center	88	43	68.6	4.89	
Hallettsville	98	64	82.2	1.39	
Haskell	96	48	75.1	2.59	
Hempstead	...	...	.....	5.80	
Henrietta	95	51	76.0	4.33	
Hewitt	...	...	.....	5.30	
Hillsboro	99	56	79.0	2.70	
Hondo	96	58	79.4	6.03	
Houston	99	65	81.7	5.80	
Hubbard	95	53	78.2	4.85	
Huntsville	98	61	79.4	1.55	
Jefferson	92	62	77.9	2.29	
Jewett	96	56	78.3	4.02	
Junction	...	...	.....	4.10	
Kaufman	99	57	79.6	4.82	
Kent	95	51	70.8	T	
Knickerbocker	91	46	71.8	3.90	
Kopperl	...	...	.....	2.18	
Lampasas	98	51	77.6	3.61	
Lapara	...	...	.....	2.27	
Liberty	...	...	.....	7.63	
Llano	98	...	.....	3.40	
Longlake	...	...	.....	4.70	
Longview	95	62	78.8	3.47	
Luling	98	59	81.4	1.81	
Marlin	99	57	80.1	2.88	
Mexia	98	59	79.0	4.01	
Miami	90	40	70.2	1.83	
Mount Blanco	91	46	70.2	6.26	
Mount Pleasant	96	58	78.4	0.75	
Nacogdoches	94	61	77.6	1.74	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Nazareth	88	39	68.2	2.88	
New Braunfels	96	62	79.9	1.45	
Panter	...	...	.....	5.78	
Paris	95	60	80.7	4.40	
Port Lavaca	95	62	82.1	7.25	
Quanah	96	45	75.0	3.43	
Rhineland	95	46	73.9	1.65	
Riverside	...	...	.....	3.73	
Rockisland	98	62	80.4	4.69	
Rockland	...	...	.....	4.21	
Rockport	90	64	78.0	2.44	
Sabinal	98	56	80.0	7.29	
San Marcos	94	63	78.2	3.34	
San Saba	96	53	77.0	2.84	
Santa Gertrude	...	...	.....	3.10	
Seymour	93	49	74.8	2.35	
Sherman	92	58	78.2	2.69	
Sonora	92	53	74.3	8.00	
Temple	96	47	77.2	3.92	
Texline	90	45	65.2	2.85	
Tilden	104	59	82.6	6.46	
Valley Junction	...	...	.....	4.66	
Victoria	95	64	80.2	3.07	
Waco	98	60	80.0	5.77	
Waxahachie	97	56	78.6	2.65	
Weatherford	96	55	76.9	3.36	
Wharton	97	62	80.8	4.96	
Willspoint	95	55	77.9	3.96	
Utah.					
Alta	75	20	49.7	1.93	T.
Beaver	81	30	56.6	1.27	
Blackrock	91	32	60.8	2.33	
Blacksmith Fork	...	...	.....	1.14	
Castledale	89	26	54.8	0.60	
Castle Rock	...	...	.....	1.13	
Cedar City	84[g]	35	58.6[d]	1.56	
Corinne	90	37	61.8	0.67	
Coyote	84	26	54.8	2.55	
Deseret	86	30	59.8	0.95	
Emery	86	28	57.4	1.40	
Enterprise	...	...	.....	1.38	
Escalante	84[g]	33[g]	58.4[g]	1.21	
Farmington	85	37	59.6	1.49	
Fillmore	90	39	64.2	2.38	
Fort Duchesne	89	36	60.7	0.93	
Garrison	89	30	61.2	0.50	
Giles	94	40	64.5	1.27	
Government Creek	86	32	61.0	0.97	
Grantsville	...	...	.....	1.28	
Grayson	89	29	60.2	2.81	
Heber[i]	83	28	54.2	.....	
Henefer	86	24	57.1	0.56	
Hite	99	48	72.6	1.84	
Huntsville	...	...	.....	1.69	
Indianola	...	...	.....	0.04	
Kanab	84[g]	25[g]	58.0[d]	0.30	
La Sal	80	30	56.7	1.83	
Levan	83	34	58.7	1.74	
Loa	78	28	51.5	1.30	
Logan	84	42	64.6	1.62	
Manti	84[g]	33[e]	57.6[d]	1.52	
Marion	...	...	.....	0.71	T.
Marysvale	84	29	56.4	1.33	T.
Meadowville	78	30	53.8	0.90	
Millville	...	...	.....	1.18	
Moab	95	40	66.0	2.08	
Morgan	83	30	56.4	0.91	
Mount Nebo	88	39	63.8	1.18	
Mount Pleasant	85	34	59.6	1.24	
Nephi	...	...	.....	0.71	
Oak City	87	37	63.0	0.94	
Ogden	82	40	61.4	1.30	
Parowan	82	33	58.4	3.49	
Payson	...	...	.....	0.94	
Pinto	79[g]	28[g]	54.5[g]	1.82	
Plateau	81	27	53.9	2.94	
Provo	93	35	64.4	0.70	
Ranch	80	30	53.8	0.70	
Randolph	...	...	.....	2.17	
Rockville	96	40	73.0	0.78	
St. George	98	37	68.2	0.59	
Salt Air	81	41	62.4	1.20	
San Juan	...	...	.....	2.86	
Scipio	84	30	58.5	1.68	
Snowville	89	25	56.6	0.27	
Strawberry Valley[k]	81	30	53.6	.....	
Sunnyside	...	...	.....	1.83	T.
Theodore	85	36	59.4	1.51	
Thistle	95	30	64.6	.....	
Tooele	85	40	62.4	1.26	
Tropic	84	35	58.6	1.31	
Trout Creek	87	30	60.0	1.22	
Utah Lake	85	34	60.1	1.15	
Vernal	83	39	60.8	1.00	
Wellington	90	32	59.5	1.02	
Vermont.					
Bloomfield	83	26	57.2	3.43	
Cavendish	97	24	62.4	1.41	

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Vermont—Cont'd.	°	°	°	*Ins.*	*Ins.*
Chelsea	81	28	56.5	1.28	
Enosburg Falls	89	25	59.5	3.79	
Jacksonville	87	29	58.5	1.88	
Manchester	83	30	61.4	3.77	
Norwich	86	26	59.1	1.95	
St. Johnsbury	85	28	59.6	2.70	
Wells	82	32	61.1	2.18	
Westfield	92	37	.....	3.81	
Woodstock	82	28	56.4	1.50	
Virginia.					
Arvonia	94	47	72.3	1.75	
Ashland	93	50	72.6	1.23	
Barboursville	89	50	71.9	3.35	
Bigstone Gap	84	55	71.0	4.42	
Blacksburg	87	49	67.2	4.72	
Buchanan	...	...	.....	3.39	
Burkes Garden	82	72	63.6	4.82	
Callaville	92	50	72.1	1.29	
Charlottesville	91	48	72.2	1.95	
Clarksville	...	...	.....	0.69	
Columbia	89	49	71.2	1.98	
Dale Enterprise	95	42	69.0	2.84	
Danville	...	...	.....	1.72	
Dinwiddie	93	45	73.2	0.46	
Doswell	94	49	73.1	0.56	
Elk Knob	84	59	70.4	4.36	
Farmville	91	50	71.9	0.90	
Fredericksburg	89	49	71.9	0.98	
Grahams Forge	83	53	68.4	4.64	
Hampton	91	62	76.4	0.59	
Hot Springs	82	50	65.6	3.84	
Ivanhoe	...	...	.....	2.44	
Lexington	94	50	70.1	3.03	
Lincoln	95	41	70.6	1.59	
Marion	87	49	68.2	2.28	
Milford	90	41	69.5	1.75	
Newport News	92	61	75.9	1.18	
Nokesville (near)	88	48	69.9	2.00	
Petersburg	93	48	75.0	0.14	
Quantico	90	49	71.7	1.51	
Radford	...	...	.....	1.74	
Randolph	...	...	.....	1.61	
Riverton	...	...	.....	3.24	
Roanoke	92	54	73.0	.....	
Rockymount	95	51	70.6	3.04	
Shenandoah	...	...	.....	1.18	
Skyland	...	...	.....	3.73	
Speers Ferry	...	...	.....	6.48	
Spottsville	94	52	73.6	0.83	
Staunton	91	46	70.1	4.14	
Stephens City	93	42	70.6	1.89	
Williamsburg	92	53	74.6	1.20	
Woodstock	92	43	70.8	2.31	
Washington.					
Aberdeen	74	39	57.0	8.26	
Anacortes	...	...	.....	.91	
Ashford	...	...	.....	4.60	
Baker	80	31	55.9	8.33	
Bellingham	70	36	57.5	3.92	
Blaine	72	37	57.0	6.18	
Brinnon	74	43	57.5	7.21	
Cedar River	...	...	.....	4.58	
Cedonia	91	29	60.1	0.64	
Centralia	84	33	58.5	4.98	
Cheney	91	30	60.0	1.05	
Clearbrook	75	32	56.1	7.20	
Clearwater	78	40	58.3	18.49	
Cle Elum	92	25	56.4	0.70	
Colfax	92	28	58.8	0.35	
Colville	90	28	56.8	0.74	
Conconully	88	31	57.8	0.50	
Coupeville	72	40	57.3	2.14	
Crescent	92	29	59.4	0.69	
Danville	90	29	59.0	0.69	
Easton	...	...	.....	1.40	
East Sound	75	33	54.2	3.59	
Ellensburg	92	29	59.0	0.27	
Ephrata	95	42	65.2	0.10	
Goldendale	87	30	58.1	0.68	
Grand Mound	89[g]	33	58.6[e]	3.85	
Granite Falls	...	...	.....	6.45	
Hatton	98	28	61.8	0.14	
Ilwaco	75	41	57.9	8.27	
Kennewick	97[g]	37[g]	64.6[d]	0.03	
Kiona	96	33	65.0	0.62	
Kosmos	84	35	59.8	4.66	
Lacenter	85	36	57.6	4.25	
Lakeside	91	41	64.4	0.20	
Lester	87	29	58.2	3.30	T.
Merritt	...	...	.....	2.04	
Mount Pleasant	83	40	60.5	4.00	
Moxee	97	29	62.4	0.24	
Northport	86	21	55.0	1.22	
Odessa	93	30	61.8	0.68	
Olga	69	42	56.0	3.59	
Olympia	84	32	57.4	5.24	
Pinehill	90	35	62.6	1.11	
Pomeroy	94	33	62.2	0.41	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Port Townsend	70	44	56.4	1.74	
Prosser	86	36	59.4	0.42	
Quinlault	80	32	58.0	19.55	
Republic	88	26	56.4	0.50	
Rex Creek	86[b]	45[b]	63.8[b]	0.32	
Rock Lake				0.56	
Rosalia	90	30	58.8	0.53	
Ruby Hill	84	32	56.9	0.43	
Sedro	72	39	57.6	6.79	
Sixprong	94	41	65.8	0.51	
Snohomish	80	38	58.2	4.60	
Snoqualmie	84	37	59.2	4.45	
Stehekin	81	36	57.8	1.20	
Sunnyside	89	34	60.1	0.27	
Touchet	98	32	66.2	0.24	
Trinidad	97	42	69.8	T.	
Twisp	95	30	60.7	0.09	
Union	84	37	59.2	9.27	
Vancouver	88	35	61.8	2.09	
Vashon	73	44	58.2	4.42	
Wahluke	96	38[c]	66.3[b]	0.80	
Waterville	85	34	60.0	0.24	
Wenatchee (near)	87	40	61.8	0.13	
Wilbur	88	16	56.8	0.82	
Winthrop	90	31	60.2	0.27	
Yale	88	39	60.2	9.55	
Zindel				0.80	
West Virginia.					
Bancroft	92	51	72.6	4.47	
Bayard	84	38	63.0	3.77	
Beckley	87	52	71.3	3.96	
Bens Run	94	49	72.0	1.64	
Berkley Springs	93[c]	39[c]	70.2[c]	1.18	
Bluefield	87	52	68.8	3.40	
Burlington	88	40	67.6	2.09	
Cairo	92	46	71.6	2.99	
Central	93	42	69.0	2.76	
Charleston	89	52	73.3	3.66	
Creston	89	47	70.4	3.63	
Cuba	91	45	70.6	2.65	
Davis				3.50	
Doane	90	54	73.6	5.09	
Elkhorn	87	53	69.2	2.89	
Fairmont	94	45	68.4	1.98	
Glenville	92	49	71.5	2.30	
Grafton	93	46	70.0	2.67	
Green Sulphur Springs	86	47	68.0	3.64	
Harpers Ferry				0.57	
Hinton	89	57	71.6	3.01	
Huntington	90	51	71.9	3.78	
Leonard	81	52	65.6	5.20	
Lewisburg	88	50	68.2	3.73	
Logan	88	54	72.2	4.62	
Lost City	90	43		1.18	
Lost Creek	93	45	70.0	3.51	
Madison	91	55	72.4	4.48	
Mannington	93	43	69.2	2.27	
Martinsburg	91	44	69.4	0.70	
Moorefield	93	39	69.2	3.80	
Mooresville				2.58	
Morgantown	91	47	69.8	2.85	
Moundsville	89	43	69.4	2.53	
New Cumberland	93	42	67.9	3.10	
New Martinsville	94	48	71.5	2.58	
Nuttallburg	83	49	65.1	2.52	
Oceana	90	55	72.4	3.55	
Parsons	90	42	67.4	4.41	
Philippi	91	41	68.2	3.58	
Pickens	85	46	65.4	5.44	
Point Pleasant	89	49	72.2	1.86	
Powellton	92	52	71.3	5.31	
Princeton				5.20	
Romney	97	43	71.8	1.91	
Rowlesburg				4.91	
Ryan	92	45	70.2	3.53	
Smithfield	93	45	71.0	2.84	
Southside	89	47	71.0	2.75	
Spencer	92	44	68.7	4.11	
Sutton	95	52	72.8	4.90	
Terra Alta	85	49	68.2	2.35	
Union	85	49	68.6	3.33	
Uppertract	93	40	68.5	2.02	
Wellsburg	85	46	67.7	4.32	
Weston	96	50	70.6	2.27	
Wheeling				2.73	
Williamson	88	59	73.4	2.83	
Wisconsin.					
Amherst	91	33	64.2	5.47	
Antigo	90	32	62.7	2.25	
Appleton	88	39	66.1	3.73	
Appleton Marsh	91	33	62.6	4.49	
Ashland	90	35	64.2	5.04	
Barron	92	30	61.8	2.08	
Beloit	86	42	66.2	3.19	
Brodhead	91	41	67.4	3.65	
Burnett	90	37	65.0	1.91	
Butternut	92	26	61.3	3.85	
Chilton	91	37	65.7	4.79	
Wisconsin—Cont'd.					
Downing	92	29	60.8	4.91	
Eau Claire	91	36	66.1	4.13	
Florence	88	30	60.0	3.39	
Grand Rapids	91	36	64.6	3.91	
Grand River Locks				4.15	
Grantsburg	93	28	62.6	2.61	
Hancock	90	34	64.4	3.88	
Harvey	91	37	65.9	2.34	
Hayward	88	26	58.8	3.45	
Hillsboro	92	32	63.9	4.58	
Koepenick	93	28	63.0	2.50	
Lancaster	91	35	66.2	3.07	
Manitowoc	88	44	64.4	1.91	
Mauston	88	34	64.3	4.27	
Meadow Valley	96	29	62.9	3.46	
Medford	93	31	65.8	2.85	
Menasha				1.57	
Merrill	94	31	63.2	3.94	
Minocqua				2.10	
Mount Horeb	91	40	66.2	2.31	
Neillsville	94	31	65.7	3.22	
New London	93	35	65.0	3.47	
New Richmond	94[d]	33[d]	65.8[d]	4.36	
Oconto	92	35	65.0	1.79	
Osceola	93	30	64.0	3.75	
Oshkosh	91	36	66.4	3.63	
Pine River	93	36	65.6	3.09	
Portage	85	37	64.8	3.34	
Port Washington	92	42	64.9	4.05	
Prairie du Chien	95	37	67.8	5.19	
Prentice	90	28	62.4	3.50	
Racine	93	49	67.8	7.30	
Sheboygan	94	46	66.2	2.59	
Shullsburg	89	36	66.6	2.52	
Solon Springs	92	26	59.0	4.28	
Stanley	89	29	63.6	3.81	
Spooner	90[c]	26[c]	61.6[c]	3.51	
Stevens Point	92	32	63.4	3.67	
Sturgeon Bay	89	36	62.8	2.71	
Valley Junction	89	28	62.8	5.10	
Viroqua	89	37	65.4	5.30	
Watertown	89	38	65.2	2.06	
Waukesha				2.84	
Waupaca	95	35	65.6	3.00	
Wausau	91	33	63.9	3.20	
Wyoming.					
Afton	82	22	54.0	1.10	
Alcova	100	34	63.4	1.31	
Barnum				0.92	
Bedford	80	21	51.4	0.81	T.
Blue Cap	75	20	45.7	0.34	3.4
Border	80	20	51.6	0.60	
Buffalo	91	27	58.0	0.78	
Cambria				1.92	
Chugwater	89	31	58.2	2.15	
Clark	90	36	64.0	0.32	
Clear Creek Cabin	74	23	48.6	0.47	T.
Corbette	91	32	61.6	0.43	
Daniel	77	15	47.2	0.60	
Elk Mountain				1.71	6.0
Evanston	79	28	53.8	0.97	
Experiment Farm				1.49	T.
Fort Laramie	96	33	60.6	3.08	
Fort Washakie	85	30	56.0	0.20	
Gillette	91	36	66.0	1.70	
Granite Canyon	82	28	51.2	2.93	2.0
Granite Springs	87	31	57.0	2.58	6.9
Green River	85	28	56.2	0.68	
Griggs	94	27	57.5	0.78	
Hatton				3.05	12.0
Hyattville	91	32	61.8		
Jackson	81	18	50.1	0.40	
Kirtley	88	30	57.6	2.90	
Laramie	81	30	53.6	2.09	3.0
Leo	81	30	55.2	1.50	0.5
Little Medicine	81	27	51.2	1.44	
Lolabama Ranch	79	19	51.4	0.32	
Moorecroft	95	30	61.4	1.11	
Moore	85	30	56.9	3.77	1.0
New Castle	92	32	62.7	1.06	
Pathfinder	93	32	60.2	1.23	
Phillips	90	25	56.2	2.76	
Pine Bluff	93	35	60.4	0.71	
Pinedale	80	17	50.1	0.40	
Rawlins	93	30	58.6	0.67	
Saratoga	84	30	55.8	1.45	0.2
Sheridan	89	28	58.6	0.75	
Shoshone Canyon	88	35	62.6	0.46	
South Pass City	75	12	47.2	0.60	6.0
Wells	70	15	44.7	0.73	T.
Wheatland	95	36	64.9	2.60	
Wolf	90	38	64.8	0.38	
Yellowstone Pk. (F'tain)	75	20	48.4	0.10	
Yellowstone Pk. (G'd Cn.)	73	21	46.8	1.10	
Yellowstone Pk. (Lake)	84	24	47.0	0.83	
Yellowstone Pk. (Norris)	75	17	46.6	1.01	T.
Yellowstone Pk (Riv'side)	77	18	47.6	0.49	
Yellowstone Pk (Snake R)	86	19	47.7	0.88	
Wyoming—Cont'd.					
Yellowstone Pk. (Soda B.)	76	16	48.2	0.88	
Yellowstone Pk. (Thumb)	82	20	47.3	2.24	6.5
Yellowstone Pk. (Up. B.)	77	21	52.4	0.63	
Porto Rico.					
Adjuntas	101	59	76.8	12.04	
Aguirre	100	70	82.2	12.52	
Albonita	86	60	73.2	9.18	
Anasco	99	63	79.6	8.22	
Arecibo[f]	93	64	77.0		
Barros	88	61	74.5	11.71	
Bayamon	96	66	79.0	7.31	
Caguas	95	60	77.6	7.52	
Canovanas	94	72	80.6	11.25	
Cayey	88	60	74.0	8.47	
Coamo	94	67	80.0	5.54	
Corozal	91	56	75.2	6.79	
Fajardo	93	70	81.0	14.04	
Guanica	97	65	79.4	5.29	
Hacienda Colosa	91	67	79.0	8.04	
Hacienda Josefa				12.68	
Isolina	90	64	75.4	19.12	
Juana Diaz		70	83.0	7.24	
La Carlemita	88	64	74.8	15.25	
Lares	92	63	77.2	11.53	
Las Cruces[i]	86	65	76.2		
Las Marias	91	64	77.1	10.75	
Manati	96	66	80.0	6.23	
Maunabo	94	66[j]	81.0[e]	13.45	
Mayaguez	92	66	79.2	9.53	
Rio Blanco	91	67	78.6	13.30	
Rio Piedras				7.85	
San German	94	67	79.9	6.69	
San Lorenzo	96	60	78.4	9.42	
San Salvador	86	63	74.0	16.92	
Santa Isabel	92	70	80.4	6.79	
Vieques	93	68	80.2	17.86	
Yabucoa				17.82	
Yauco	94	65	79.5	7.35	
New Brunswick.					
St. John	76	39	55.6	1.23	
Nicaragua.					
Bluefields	92	74	82.0	4.42	

Late reports for August, 1906.

Alaska.					
Copper Center	69	26	52.5	0.69	
Chestochena	71	32	51.2	1.48	
Fairbanks	77	32	55.6	1.50	
Fort Egbert		45		1.28	
Fort Liscum	64	35	51.0	8.46	
Holy Cross Mission	69	34	53.3	3.22	
Juneau	72	39	55.2	3.21	
Kenai	72	31	53.8	2.95	
Ketchemstock	76	25	50.2	2.51	
Loring	78	41	56.1	15.21	
Nome				2.50	
Rampart	82	25	55.4	2.40	
St. Michael	75	43	55.6		
Skagway	65	35	53.2	2.26	
Sunrise	68	36	52.7	3.70	
Teikhill	76	27	50.9	0.72	
Wales	62	38	46.9		
Wortmans	92	28	55.8		
Arizona.					
Chlarsons Mills	70	37	54.0	6.15	
Intake Dam				3.76	
Colorado.					
Breckenridge	77	29	52.5	1.54	
Gladstone				2.98	
Gothic	78	27	52.1	1.96	
Lime Creek				3.57	
Power House	83	41	61.3	2.75	
Red Mountain				2.97	
Terminal Dam				2.47	
District of Columbia.					
West Washington	97	64	78.0	13.87	
Florida.					
Otter Creek	95			10.27	
Idaho.					
Johnsons	91	30	60.0	0.02	
Ola	101	43	71.1	0.25	
Orofino				1.53	
Iowa.					
Denison	97	37	73.3	1.77	
Grundy Center	98	48	77.2	1.72	
Mount Vernon	97	45	74.9	4.75	
Kansas.					
Columbus	94	48	76.0	3.42	
Madison	98	45	76.7	5.43	
Phillipsburg	103	48	76.2	3.61	
Sedan	95	49	77.0	3.81	
Michigan.					
Kalamazoo[k]	91	49	73.4		

TABLE II.—*Climatological record of cooperative observers*—Continued. *Late reports for August, 1906*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Minnesota.	°	°	°	*Ins.*	*Ins.*
Fairmont	94	48	70.8	6.28	
Mississippi.					
Magee	101	60	81.0	1.51	
Montana.					
Hamilton	92	45	65.0	1.45	
Ridgelawn	100	40	66.8	1.83	
Nevada.					
Morey	93	42	65.4	1.82	
Wadsworth	103	52	75.0	0.00	
New Mexico.					
Gage	.....	.....	.....	0.41	
Mountain Air	92	47	67.4	.....	
Oklahoma.					
Jefferson	93	52	76.8	4.26	
Texas.					
Fredericksburg	95*	55*	79.2*	3.71	
Llano	99	46	73.6	1.20	
Panter	.....	.....	.....	7.33	
Utah.					
Grantsville	.....	.....	.....	2.42	
Virginia.					
Burkes Garden	82	54	69.4	9.47	
West Virginia.					
Davis	.....	.....	.....	5.97	
Wyoming.					
Casper	.....	.....	.....	0.82	
Cody	98	35	67.0	2.05	
Eatons Ranch	96	37	66.4	2.82	
Fort Laramie	100	37	70.3	2.02	
Lusk	93	38[4]	62.5*	4.35	
New Castle	98	33	70.2	1.34	
Story	93*	33*	62.0*	4.92	
Porto Rico.					
Humacao	87	70	78 9	8.62	
La Carmelita	90	65	76.8	8.18	
Yauco	95	66	79.8	3.40	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance, "a" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks of whatever duration, in the precipitation record receive appropriate notice.

CORRECTION.

August, 1906, page 385, on line beginning with Southern Plateau, make departure from normal precipitation read +0.6 instead of —0.6.

TABLE III.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the month of September, 1906.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	16	21	4	35	s. 81 w.	31
Portland, Me	16	24	5	27	s. 70 w.	23
Concord, N. H. †	13	9	7	8	n. 14 w.	4
Burlington, Vt. †	7	18	6	4	s. 10 e.	11
Northfield, Vt	11	41	5	16	s. 20 w.	32
Boston, Mass	19	20	12	22	s. 84 w.	10
Nantucket, Mass	15	23	17	16	s. 7 e.	8
Block Island, R. I	22	25	16	28	s. 76 w.	12
Providence, R. I	20	19	12	23	n. 85 w.	11
Hartford, Conn	23	26	8	12	s. 53 w.	5
New Haven, Conn	23	22	11	17	n. 80 w.	6
Middle Atlantic States.						
Albany, N. Y	22	26	9	12	s. 37 w.	5
Binghamton, N. Y. †	10	4	12	9	n. 27 e.	7
New York, N. Y	15	20	18	19	s. 11 w.	5
Harrisburg, Pa	18	17	20	20	n.	1
Philadelphia, Pa	23	19	17	17	n.	4
Scranton, Pa	25	18	17	19	n. 16 w.	7
Atlantic City, N. J	17	19	17	18	s. 27 w.	2
Cape May, N. J	20	20	19	13	e.	6
Baltimore, Md	21	15	18	16	n. 18 e.	6
Washington, D. C	22	17	17	16	n. 11 e.	5
Lynchburg, Va	18	17	28	15	n. 86 e.	13
Mount Weather, Va	17	19	16	24	s. 76 w.	8
Norfolk, Va	18	23	21	14	s. 54 e.	9
Richmond, Va	28	19	16	10	n. 34 e.	11
Wytheville, Va	9	12	31	18	s. 77 e.	13
South Atlantic States.						
Asheville, N. C	12	34	23	8	s. 34 e.	27
Charlotte, N. C	19	20	27	11	s. 87 e.	16
Hatteras, N. C	19	18	20	17	n. 72 e.	3
Raleigh, N. C	24	17	16	14	n. 16 e.	7
Wilmington, N. C	22	16	19	16	n. 27 e.	7
Charleston, S. C	11	26	25	8	s. 48 e.	23
Columbia, S. C	19	21	28	8	s. 84 e.	20
Augusta, Ga	21	17	30	7	n. 80 e.	23
Savannah, Ga	16	26	19	11	s. 39 e.	13
Jacksonville, Fla	13	21	33	8	s. 72 e.	26
Florida Peninsula.						
Jupiter, Fla	14	19	37	7	s. 81 e.	30
Key West, Fla	18	8	40	7	n. 73 e.	34
Tampa, Fla	29	4	35	8	n. 47 e.	37
Eastern Gulf States.						
Atlanta, Ga	17	14	30	12	n. 81 e.	18
Macon, Ga. †	11	12	11	2	s. 84 e.	9
Thomasville, Ga	11	19	30	11	s. 67 e.	21
Pensacola, Fla. †	17	3	11	8	n. 12 e.	14
Anniston, Ala	14	21	32	3	s. 76 e.	30
Birmingham, Ala	18	13	34	8	n. 79 e.	26
Mobile, Ala	29	14	15	17	n. 61 w.	31
Montgomery, Ala	17	19	28	12	s. 83 e.	16
Meridian, Miss	11	18	26	18	s. 41 e.	11
Vicksburg, Miss	14	22	28	12	s. 63 e.	18
New Orleans, La	13	28	16	14	s. 8 e.	15
Western Gulf States.						
Shreveport, La	22	18	23	10	n. 73 e.	14
Bentonville, Ark. †	7	13	14	3	s. 61 e.	12
Fort Smith, Ark	10	12	39	9	s. 86 e.	30
Little Rock, Ark	21	14	17	19	n. 16 w.	7
Corpus Christi, Tex	16	27	23	10	s. 50 e.	17
Fort Worth, Tex	17	26	20	14	s. 34 e.	11
Galveston, Tex	16	26	20	7	s. 52 e.	16
Palestine, Tex	21	26	16	11	s. 45 e.	7
San Antonio, Tex	20	18	29	8	n. 85 e.	21
Taylor, Tex. †	10	9	7	11	n. 76 w.	4
Ohio Valley and Tennessee.						
Chattanooga, Tenn	22	18	18	17	n. 14 e.	4
Knoxville, Tenn	28	14	21	15	n. 23 e.	15
Memphis, Tenn	16	20	22	11	s. 70 e.	12
Nashville, Tenn	16	17	29	13	s. 87 e.	16
Lexington, Ky. †	6	12	14	5	s. 56 e.	11
Louisville, Ky	26	16	20	9	n. 48 e.	15
Evansville, Ind. †	13	8	16	2	n. 70 e.	15
Indianapolis, Ind	23	14	35	8	n. 70 e.	29
Cincinnati, Ohio	23	15	27	12	n. 62 e.	17
Columbus, Ohio	18	21	31	9	s. 82 e.	22
Pittsburg, Pa	25	16	20	16	n. 24 e.	10
Parkersburg, W. Va	19	19	24	9	e.	15
Elkins, W. Va	23	18	17	11	n. 50 e.	8
Lower Lake Region.						
Buffalo, N. Y	12	27	13	23	s. 34 w.	18
Canton, N. Y †	8	11	7	13	s. 63 w.	7
Oswego, N. Y	16	31	14	15	s. 86 w.	15
Rochester, N. Y	16	21	10	29	s. 75 w.	20
Syracuse, N. Y	13	31	9	14	s. 16 w.	19
Erie, Pa	12	27	24	12	s. 39 e.	19
Cleveland, Ohio	17	27	28	5	s. 67 e.	25
Sandusky, Ohio †	4	16	9	10	s. 5 w.	12
Toledo, Ohio	15	22	22	20	s. 16 e.	7
Detroit, Mich	15	18	21	17	s. 53 e.	5
Upper Lake Region.						
Alpena, Mich	20	18	11	24	n. 81 w.	13
Escanaba, Mich	22	24	15	15	s.	2
Grand Haven, Mich	19	21	22	10	s. 81 e.	12
Grand Rapids, Mich	17	18	18	21	s. 72 w.	3
Houghton, Mich. †	6	8	11	11	s.	2
Marquette, Mich	21	21	9	25	w.	16
Port Huron, Mich	14	26	18	14	s. 18 e.	13
Sault Ste. Marie, Mich	16	17	21	20	s. 45 e.	1
Chicago, Ill	12	21	22	16	s. 34 e.	11
Milwaukee, Wis	18	21	14	17	s. 45 w.	4
Green Bay, Wis	16	29	15	16	s. 4 w.	13
Duluth, Minn	23	15	18	24	n. 37 w.	10
North Dakota.						
Moorhead, Minn	16	31	19	13	s. 22 e.	16
Bismarck, N. Dak	14	23	17	21	s. 24 w.	10
Devils Lake, N. Dak	11	27	15	23	s. 27 w.	18
Williston, N. Dak	16	24	9	21	s. 56 w.	14
Upper Mississippi Valley.						
Minneapolis, Minn. *	6	14	10	7	s. 21 e.	8
Madison, Wis	17	26	17	14	s. 18 e.	10
Charles City, Iowa	16	25	21	14	s. 38 e.	11
St. Paul, Minn	17	30	16	8	s. 32 e.	15
La Crosse, Wis. †	8	17	3	4	s. 6 w.	9
Davenport, Iowa	15	16	26	14	s. 85 e.	12
Des Moines, Iowa	17	27	19	10	s. 42 e.	14
Dubuque, Iowa	16	27	21	14	s. 32 e.	13
Keokuk, Iowa	16	22	21	11	s. 59 e.	12
Cairo, Ill	22	21	21	10	n. 85 e.	11
La Salle, Ill. †	8	7	16	5	n. 85 e.	11
Peoria, Ill	18	22	28	7	s. 79 e.	21
Springfield, Ill	15	20	27	10	s. 74 e.	18
Hannibal, Mo. †	10	9	11	9	n. 63 e.	2
St. Louis, Mo	11	20	29	10	s. 65 e.	21
Missouri Valley.						
Columbia, Mo. *	9	11	14	4	s. 79 e.	10
Kansas City, Mo	17	22	25	13	s. 67 e.	13
Springfield, Mo	14	25	28	7	s. 62 e.	24
Iola, Kans. †	10	13	7	7	s.	3
Topeka, Kans. *	8	12	8	6	s. 27 e.	4
Lincoln, Nebr	20	24	20	9	s. 70 e.	12
Omaha, Nebr	20	25	11	10	s. 11 e.	5
Valentine, Nebr	22	22	9	17	w.	8
Sioux City, Iowa †	9	12	12	5	s. 67 e.	8
Pierre, S. Dak	18	24	27	13	s. 67 e.	15
Huron, S. Dak	18	26	18	13	s. 32 e.	9
Yankton, S. Dak. †	10	13	6	12	s. 63 w.	7
Northern Slope.						
Havre, Mont	13	12	16	33	n. 87 w.	17
Miles City, Mont	17	20	16	13	s. 45 e.	4
Helena, Mont	5	34	12	24	s. 22 w.	31
Kalispell, Mont	13	16	13	33	s. 81 w.	20
Rapid City, S. Dak	18	15	13	27	n. 78 w.	14
Cheyenne, Wyo	24	18	8	23	n. 68 w.	16
Lander, Wyo	15	24	12	25	s. 55 w.	16
Yellowstone Park, Wyo	12	32	1	30	s. 55 w.	35
North Platte, Nebr	17	23	22	15	s. 49 e.	9
Middle Slope.						
Denver, Colo	18	31	13	10	s. 13 e.	13
Pueblo, Colo	17	16	28	18	n. 84 e.	10
Concordia, Kans	16	30	13	11	s. 8 e.	14
Dodge, Kans	16	21	24	8	s. 73 e.	17
Wichita, Kans	20	23	22	6	s. 79 e.	16
Oklahoma, Okla	19	32	15	5	s. 38 e.	16
Southern Slope.						
Abilene, Tex	19	30	11	9	s. 10 e.	11
Amarillo, Tex	16	26	22	9	s. 52 e.	16
Del Rio, Tex †	9	6	17	6	n. 75 e.	11
Roswell, N. Mex.	17	24	19	15	s. 30 e.	8
Southern Plateau.						
El Paso, Tex	18	4	31	18	n. 43 e.	19
Santa Fe, N. Mex	20	18	27	12	n. 82 e.	15
Flagstaff, Ariz	24	18	13	24	n. 61 w.	12
Phoenix, Ariz	8	14	25	25	s.	6
Yuma, Ariz	17	22	19	15	s. 39 e.	6
Independence, Cal	25	17	11	22	n. 54 w.	14
Middle Plateau.						
Reno, Nev	10	13	12	37	s. 83 w.	25
Tonopah, Nev	11	27	21	22	s. 3 w.	16
Winnemucca, Nev	22	13	18	23	n. 29 w.	10
Modena, Utah	7	16	14	35	s. 67 w.	23
Salt Lake City, Utah	17	21	23	16	s. 60 e.	8
Durango, Colo	29	7	5	34	n. 53 w.	36
Grand Junction, Colo	16	18	21	17	s. 76 e.	4
Northern Plateau.						
Baker City, Oreg	15	33	5	17	s. 34 w.	22
Boise, Idaho	20	15	15	25	n. 63 w.	11
Lewiston, Idaho †	2	5	25	1	s. 83 e.	24
Pocatello, Idaho	3	32	19	21	s. 4 w.	29
Spokane, Wash	6	36	12	23	s. 20 w.	32
Walla Walla, Wash	2	34	14	18	s. 7 w.	32
North Pacific Coast Region.						
North Head, Wash	23	17	15	23	n. 53 w.	10
Port Crescent, Wash. *	11	8	7	14	n. 67 w.	8
Seattle, Wash	18	21	21	12	s. 72 e.	10
Tacoma, Wash	26	20	3	24	n. 74 w.	22
Tatoosh Island, Wash	1	27	18	19	s. 2 w.	26
Portland, Oreg	17	23	9	29	s. 73 w.	21
Roseburg, Oreg	28	7	15	22	n. 18 w.	22
Middle Pacific Coast Region.						
Eureka, Cal	22	16	11	22	n. 61 w.	12
Mount Tamalpais, Cal	22	1	3	42	n. 62 w.	44
Red Bluff, Cal	24	19	15	20	n. 45 w.	7
Sacramento, Cal	10	35	18	8	s. 22 e.	27
San Francisco, Cal	6	11	6	45	s. 83 w.	39
San Jose, Cal. †	19	0	0	21	n. 48 w.	28
Southeast Farallon, Cal. *	21	0	0	21	n. 45 w.	30
South Pacific Coast Region.						
Fresno, Cal	34	2	4	35	n. 44 w.	45
Los Angeles, Cal	11	12	13	32	s. 87 w.	19
San Diego, Cal	30	7	5	33	n. 51 w.	36
San Luis Obispo, Cal	20	12	9	31	n. 70 w.	23
West Indies						
Grand Turk, W. I. †	5	11	20	2	s. 72 e.	19
San Juan, Porto Rico	7	29	33	6	s. 51 e.	35

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour, during September, 1906, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Abilene, Tex	24	1:00 p. m.	5:45 p. m.	0.77	2:48 p. m.	3:13 p. m.	0.03	0.15	0.24	0.30	0.41	0.46	.....	.....	.....	.....	.....	.....	.....	.....	.....
Albany, N. Y	20			0.32														0.24	.....	.....	.....
Alpena, Mich	21–22	11:09 p. m.	5:35 a. m.	0.99	11:09 p. m.	11:22 p. m.	0.00	0.27	0.66	0.72	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Amarillo, Tex	3	8:10 p. m.	11:45 p. m.	0.92	8:17 p. m.	8:35 p. m.	0.01	0.32	0.51	0.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Anniston, Ala	5	3:45 p. m.	11:45 p. m.	4.35	3:45 p. m.	4:40 p. m.	0.00	0.29	0.86	1.45	2.10	2.65	2.97	3.25	3.43	3.50	3.56	3.60	.....	.....	.....
Do	24	12:35 p. m.	2:40 p. m.	1.83	12:38 p. m.	1:13 p. m.	0.01	0.20	0.75	1.19	1.45	1.63	1.70	1.76	.....	.....	.....	.....	.....	.....	.....
Do	29	7:49 a. m.	12:00 m.	1.60	9:26 a. m.	10:46 a. m.	0.06	0.12	0.20	0.31	0.38	0.40	0.41	0.42	0.43	0.46	0.60	0.72	1.41	.....	.....
Asheville, N. C	21	6:00 p. m.	7:25 p. m.	0.68	6:21 p. m.	6:48 p. m.	0.12	0.07	0.16	0.22	0.35	0.49	0.56	.....	.....	.....	.....	.....	.....	.....	.....
Atlanta, Ga	9	2:24 p. m.	3:55 p. m.	0.88	2:28 p. m.	2:51 p. m.	0.02	0.10	0.25	0.41	0.56	0.66	.....	.....	.....	.....	.....	.....	.....	.....	.....
Atlantic City, N. J	13	D. N.	D. N.	1.20	2:03 a. m.	3:05 a. m.	0.01	0.15	0.36	0.46	0.48	0.51	0.59	0.73	0.78	0.83	0.86	1.09	.....	.....	.....
Augusta, Ga	1	2:35 p. m.	5:00 p. m.	2.00	3:41 p. m.	4:44 p. m.	0.16	0.09	0.18	0.36	0.64	0.93	1.21	1.33	1.44	1.47	1.57	1.68	1.84	.....	.....
Do	12	1:18 p. m.	4:50 p. m.	1.42	2:23 p. m.	2:51 p. m.	0.38	0.16	0.46	0.54	0.63	0.76	0.83	.....	.....	.....	.....	.....	.....	.....	.....
Baltimore, Md	20			0.10														0.10	.....	.....	.....
Bentonville, Ark	8	4:25 p. m.	5:25 p. m.	1.11	4:40 p. m.	5:10 p. m.	0.01	0.10	0.32	0.47	0.68	0.92	1.07	.....	.....	.....	.....	.....	.....	.....	.....
Binghamton, N. Y	30			0.59													.....	0.27	.....	.....	.....
Birmingham, Ala	11	1:22 p. m.	3:50 p. m.	1.40	1:30 p. m.	2:13 p. m.	0.02	0.24	0.34	0.39	0.46	0.91	1.06	1.10	1.21	1.34	.....	.....	.....	.....	.....
					8:12 a. m.[1]	9:02 a. m.[1]	3.11	0.08	0.11	0.26	0.51	0.78	0.94	1.09	1.14	1.37	1.51	.....	.....	.....	.....
Do	27–28	3:30 a. m.	12:20 p. m.[1]	7.31	9:02 a. m.[1]	9:52 a. m.[1]	.....	1.52	1.57	1.57	1.60	1.63	1.65	1.77	1.87	1.90	1.98	.....	.....	.....	.....
					9:52 a. m.[1]	10:58 a. m.[1]	.....	2.11	2.29	2.33	2.45	2.53	2.64	2.86	3.07	3.22	3.33	3.54	.....	.....	.....
Bismarck, N. Dak	14	.....	.....	0.38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.11	.....	.....	.....
Block Island, R. I	22	.....	.....	0.77	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.27	.....	.....	.....
Boise, Idaho	12–13	.....	.....	0.32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.07	.....	.....	.....
Boston, Mass	30	.....	.....	0.83	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.62	.....	.....	.....
Buffalo, N. Y	3	3:15 a. m.	4:45 a. m.	0.87	3:25 a. m.	3:46 a. m.	0.02	0.11	0.47	0.67	0.73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cairo, Ill	5	3:55 p. m.	5:15 p. m.	1.10	4:01 p. m.	4:21 p. m.	0.01	0.23	0.55	0.81	1.04	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Canton, N. Y	22	7:12 p. m.	8:55 p. m.	1.02	7:21 p. m.	7:56 p. m.	0.01	0.26	0.58	0.67	0.68	0.76	0.81	.....	.....	.....	.....	.....	.....	.....	.....
Charles City, Iowa	2	1:45 a. m.	4:30 a. m.	0.82	5:04 a. m.	5:40 a. m.	0.02	0.20	0.27	0.28	0.50	0.50	0.58	0.67	0.75	.....	.....	.....	.....	.....	.....
Charleston, S. C	20			0.43					0.32												
Charlotte, N. C	3			0.41						0.38											
Chattanooga, Tenn	20			0.47					0.44												
Cheyenne, Wyo	15–16			1.09														0.35			
Chicago, Ill	28–29			2.73														0.41			
Cincinnati, Ohio	29	2:40 p. m.	4:15 p. m.	0.80	3:15 p. m.	3:52 p. m.	0.04	0.30	0.31	0.31	0.32	0.32	0.50	0.68	0.75	.....	.....	.....	.....	.....	.....
Cleveland, Ohio	22	2:15 p. m.	3:15 p. m.	0.55	2:34 p. m.	2:52 p. m.	0.01	0.06	0.19	0.29	0.47	0.51	.....	.....	.....	.....	.....	.....	.....	.....	.....
Columbia, Mo	8	2:35 p. m.	3:50 p. m.	0.75	2:55 p. m.	3:21 p. m.	0.02	0.07	0.28	0.46	0.56	0.69	.....	.....	.....	.....	.....	.....	.....	.....	.....
Columbia, S. C	24			0.66						0.37											
Columbus, Ohio	28–29			0.76									0.32								
Concord, N. H	18			0.19						0.17											
Corpus Christi, Tex	4	11:30 a. m.	3:16 p. m.	3.39	12:27 p. m.	1:17 p. m.	0.33	0.24	0.47	0.70	0.71	0.71	0.71	0.72	0.75	1.01	1.47	.....	.....	.....	.....
					1:17 p. m.	1:48 p. m.	.....	1.79	2.04	2.17	2.20	2.29	2.45	2.47	.....	.....	.....	.....	.....	.....	.....
Davenport, Iowa	28–29			2.30														0.35			
Del Rio, Tex	1	3:55 p. m.	9:50 p. m.	2.73	3:55 p. m.	5:03 p. m.	0.00	0.19	0.43	0.62	0.75	0.95	1.06	1.10	1.29	1.45	1.62	2.14	2.55	.....	.....
Denver, Colo	17			0.50														0.38			
Des Moines, Iowa	16–17			1.23									0.33								
Detroit, Mich	29			1.24														0.57			
Dodge, Kans	2	8:20 p. m.	11:45 p. m.	2.02	8:32 p. m.	9:27 p. m.	0.02	0.18	0.39	0.62	0.82	1.05	1.19	1.37	1.46	1.49	1.56	1.68	.....	.....	.....
Do	16–17	4:35 p. m.	12:19 p. m.	5.89	6:28 p. m.	(2)	0.10	0.35	0.71	0.96	1.30	1.77	2.21	2.50	2.81	2.95	3.11	3.47	4.27	4.85	.....
Dubuque, Iowa	2	12:30 p. m.	1:24 p. m.	0.77	12:35 p. m.	12:47 p. m.	0.01	0.24	0.48	0.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Duluth, Minn	20–21	4:05 p. m.	1:00 p. m.	1.50	4:08 p. m.	4:33 p. m.	0.01	0.16	0.28	0.33	0.42	0.49	.....	.....	.....	.....	.....	.....	.....	.....	.....
Eastport, Me	27			0.36														0.12			
Elkins, W. Va	10	12:05 p. m.	2:25 p. m.	0.92	12:34 p. m.	1:04 p. m.	0.04	0.10	0.23	0.37	0.51	0.69	0.75	.....	.....	.....	.....	.....	.....	.....	.....
Erie, Pa	29–30			1.55														0.37			
Escanaba, Mich	11	3:09 p. m.	3:35 p. m.	0.61	3:10 p. m.	3:23 p. m.	0.01	0.37	0.56	0.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Evansville, Ind	28	1:55 p. m.	7:40 p. m.	0.78	6:14 p. m.	6:30 p. m.	0.13	0.11	0.30	0.53	0.56	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Smith, Ark	2–3	5:48 p. m.	2:30 a. m.	1.46	6:06 p. m.	6:45 p. m.	0.01	0.12	0.30	0.39	0.46	0.59	0.85	1.00	1.09	.....	.....	.....	.....	.....	.....
Do	16	1:58 p. m.	3:00 p. m.	0.73	2:07 p. m.	2:48 p. m.	0.01	0.09	0.15	0.30	0.48	0.50	0.54	0.56	0.66	0.71	.....	.....	.....	.....	.....
Fort Worth, Tex	24–25	6:55 p. m.	9:08 p. m.	1.70	4:16 a. m.	5:10 a. m.	0.55	0.12	0.20	0.26	0.30	0.40	0.48	0.59	0.71	0.80	0.91	0.95	.....	.....	.....
Galveston, Tex	11			0.49							0.49										
Grand Haven, Mich	20	1:30 a. m.	8:45 a. m.	1.27	2:47 a. m.	3:17 a. m.	0.09	0.05	0.19	0.44	0.64	0.72	0.89	.....	.....	.....	.....	.....	.....	.....	.....
Grand Rapids, Mich	28–29	5:15 p. m.	1:36 p. m.	2.52	6:24 a. m.	6:51 a. m.	1.17	0.11	0.22	0.39	0.52	0.63	0.66	.....	.....	.....	.....	.....	.....	.....	.....
Green Bay, Wis	21			0.49							0.46										
Hannibal, Mo	2			1.08						0.37											
Harrisburg, Pa	11	4:56 p. m.	7:45 p. m.	1.53	5:05 p. m.	6:35 p. m.	0.03	0.05	0.11	0.22	0.44	0.65	0.68	0.70	0.75	0.77	0.79	0.87	1.17	1.47	.....
Hartford, Conn	30	4:50 a. m.	9:10 a. m.	0.99	7:16 a. m.	8:06 a. m.	0.20	0.06	0.10	0.14	0.18	0.29	0.44	0.49	0.57	0.66	0.72	.....	.....	.....	.....
Hatteras, N. C	7	7:00 a. m.	9:25 a. m.	0.83	7:10 a. m.	7:30 a. m.	0.04	0.18	0.36	0.47	0.61	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Huron, S. Dak	19			0.88														0.46			
Indianapolis, Ind	12	4:05 p. m.	4:27 p. m.	0.84	4:07 p. m.	4:18 p. m.	0.02	0.37	0.76	0.81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	29	1:05 p. m.	7:20 p. m.	1.18	2:27 p. m.	2:57 p. m.	0.05	0.22	0.36	0.42	0.67	0.76	0.83	.....	.....	.....	.....	.....	.....	.....	.....
Iola, Kans	2–3			1.26														0.44			
Jacksonville, Fla	16			1.31														0.47			
Jupiter, Fla	24	6:20 a. m.	12:40 p. m.	4.35	8:55 a. m.	10:35 a. m.	0.10	0.05	0.15	0.32	0.42	0.54	0.69	0.87	1.09	1.42	1.69	1.98	2.44	2.83	.....
					11:13 a. m.	12:28 p. m.	3.05	0.05	0.20	0.25	0.30	0.32	0.33	0.33	0.47	0.69	0.84	1.06	1.29	.....	.....
Kansas City, Mo	10	2:34 p. m.	3:05 p. m.	0.42	2:39 p. m.	2:51 p. m.	0.02	0.22	0.37	0.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Key West, Fla	11	2:27 p. m.	3:07 p. m.	0.68	2:37 p. m.	2:51 p. m.	0.03	0.23	0.46	0.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	21	8:32 p. m.	8:50 p. m.	0.28	8:37 p. m.	8:42 p. m.	0.01	0.27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Knoxville, Tenn	30	D. N.	5:40 a. m.	1.57	1:56 a. m.	2:08 a. m.	0.28	0.16	0.42	0.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
La Crosse, Wis	2	4:00 p. m.	5:45 p. m.	0.46	5:11 p. m.	5:20 p. m.	0.07	0.10	0.34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	16	3:20 a. m.	5:05 a. m.	1.18	3:21 a. m.	3:39 a. m.	0.01	0.28	0.53	0.72	0.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	16	7:02 a. m.	9:40 a. m.	1.42	7:30 a. m.	8:20 a. m.	0.27	0.05	0.14	0.30	0.43	0.56	0.70	0.74	0.79	0.84	0.91	.....	.....	.....	.....
La Salle, Ill	28–29			3.91														0.46			
Lexington, Ky	3	12:10 a. m.	12:45 a. m.	0.37	12:13 a. m.	12:24 a. m.	0.01	0.25	0.33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	12–13	11:30 p. m.	7:45 a. m.	0.73	12:51 a. m.	1:14 a. m.	0.01	0.10	0.27	0.39	0.48	0.57	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lincoln, Nebr	14	2:58 p. m.	4:30 p. m.	1.81	3:02 p. m.	4:09 p. m.	0.02	0.09	0.18	0.27	0.36	0.44	0.61	0.87	0.96	1.04	1.17	1.66	1.78	.....	.....
Do	16	5:30 p. m.	10:00 p. m.	2.26	6:08 p. m.	7:23 p. m.	0.16	0.12	0.27	0.43	0.44	0.48	0.51	0.83	0.92	0.94	0.94	1.12	1.50	.....	.....
Little Rock, Ark	27–28			1.24														0.26			
Los Angeles, Cal	30			0.05														0.05			
Louisville, Ky	26–27			1.50														0.39			
Lynchburg, Va	12–13			0.70														0.51			
Macon, Ga	18	4:45 p. m.	5:20 p. m.	0.63	4:47 p. m.	5:06 p. m.	0.01	0.26	0.42	0.45	0.61	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	19	9:05 p. m.	11:15 p. m.	0.94	9:05 p. m.	9:53 p. m.	0.00	0.09	0.25	0.31	0.34	0.40	0.56	0.66	0.75	0.81	0.86	.....	.....	.....	.....
Madison, Wis	28			0.70														0.26			
Marquette, Mich	11	1:10 p. m.	3:25 p. m.	0.77	2:08 p. m.	2:43 p. m.	0.09	0.16	0.33	0.39	0.47	0.52	0.61	0.66	.....	.....	.....	.....	.....	.....	.....
Memphis, Tenn	22	7:05 p. m.	7:50 p. m.	0.75†	7:09 p. m.	‡	0.01	.....	.....	.....	.....	.....	.....	.....	.....	0.74†	.....	.....	.....	.....	.....
Meridian, Miss	4	12:10 p. m.	4:30 p. m.	1.45	12:17 p. m.	12:46 p. m.	0.03	0.21	0.30	0.33	0.44	0.80	0.99	.....	.....	.....	.....	.....	.....	.....	.....
Do	5	7:25 p. m.	10:45 p. m.	0.89	8:09 p. m.	8:29 p. m.	0.11	0.13	0.23	0.34	0.47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	19	1:53 p. m.	2:55 p. m.	1.31	2:08 p. m.	2:37 p. m.	0.06	0.15	0.35	0.51	0.76	1.04	1.20	.....	.....	.....	.....	.....	.....	.....	.....
Do	26–27	9:30 p. m.	9:30 p. m.	5.55	1:49 p. m.	2:49 p. m.	4.13	0.07	0.13	0.21	0.30	0.37	0.41	0.45	0.54	0.63	0.74	0.89	.....	.....	.....
Milwaukee, Wis	28–29			1.74														0.63			
Minneapolis, Minn	15	8:35 p. m.	5:30 a. m.	1.33	9:47 p. m.	10:12 p. m.	0.27	0.18	0.28	0.43	0.71	0.84	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	20	11:12 a. m.	1:00 p. m.	0.68	11:22 a. m.	11:35 a. m.	0.03	0.21	0.43	0.48	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Minneapolis, Minn	25	4:10 p. m.	5:25 p. m.	0.93	4:48 p. m.	5:08 p. m.	0.06	0.18	0.45	0.71	0.86	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montgomery, Ala	8	10:42 a. m.	5:35 p. m.	0.46	11:19 a. m.	11:33 a. m.	0.01	0.16	0.30	0.39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	30	6:15 p. m.	D. N.	0.91	6:20 p. m.	6:33 p. m.	0.01	0.10	0.26	0.41	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mount Weather, Va	26–27	.....	.....	0.57	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.16	.....	.....	.....
Nantucket, Mass	3	.....	.....	1.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.58	.....	.....	.....
Nashville, Tenn	4	12:35 p. m.	2:05 p. m.	1.68	12:37 p. m.	1:19 p. m.	0.01	0.21	0.45	0.76	1.07	1.24	1.37	1.55	1.64	.....	.....	.....	.....	.....	.....
Do	6	4:10 p. m.	7:15 p. m.	1.03	4:20 p. m.	5:05 p. m.	0.02	0.13	0.26	0.33	0.43	0.50	0.59	0.67	0.84	0.92	.....	.....	.....	.....	.....
Do	28–29	6:10 p. m.	3:00 a. m.	2.52	8:48 p. m.	10:43 p. m.	0.23	0.15	0.31	0.33	0.34	0.46	0.65	0.75	0.78	0.79	0.83	1.01	1.21	1.28	1.84
New Haven, Conn	22	8:45 a. m.	9:00 p. m.	2.41	3:00 p. m.	3:30 p. m.	0.44	0.06	0.15	0.26	0.37	0.45	0.54	.....	.....	.....	.....	.....	.....	.....	.....
					4:58 p. m.	5:28 p. m.	1.41	0.05	0.11	0.22	0.50	0.59	0.65	.....	.....	.....	.....	.....	.....	.....	.....
New Orleans, La	25	10:45 a. m.	2:45 p. m.	2.42	11:11 a. m.	12:19 p. m.	0.11	0.13	0.30	0.48	0.69	0.86	0.94	1.01	1.07	1.13	1.23	1.37	.....	.....	.....
Do	25	8:50 p. m.	D. N.	1.68	10:22 p. m.	11:14 p. m.	0.39	0.10	0.19	0.29	0.37	0.41	0.51	0.62	0.81	0.97	1.08	1.14	.....	.....	.....
New York, N. Y	12	10:03 a. m.	11:35 a. m.	0.96	10:22 a. m.	11:08 a. m.	0.06	0.10	0.24	0.41	0.57	0.65	0.67	0.71	0.75	0.81	.....	.....	.....	.....	.....
Norfolk, Va	18	.....	.....	0.24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.24	.....	.....	.....
Northfield, Vt	3	.....	.....	0.61	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.19	.....	.....	.....
North Head, Wash	7	.....	.....	1.76	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.27	.....	.....	.....
Oklahoma, Okla	11–12	9:00 p. m.	D. N.	2.76	9:15 p. m.	10:13 p. m.	0.02	0.27	0.47	0.54	0.64	0.66	0.71	0.78	0.98	1.23	1.55	1.95	.....	.....	.....
Omaha, Nebr	2	6:15 a. m.	9:30 a. m.	0.69	6:30 a. m.	6:52 a. m.	T.	0.15	0.35	0.50	0.58	0.61	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	16	3:40 p. m.	10:55 p. m.	1.41	8:37 p. m.	8:52 a. m.	0.62	0.20	0.43	0.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Palestine, Tex	24–25	.....	.....	1.48	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.60	.....	.....	.....
Parkersburg, W. Va	13	.....	.....	0.47	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.20	.....	.....	.....
Pensacola, Fla	26–27	9:33 a. m.	7:28 a. m.	3.26	12:18 a. m.	1:18 a. m.	0.69	0.05	0.14	0.24	0.31	0.41	0.49	0.61	0.69	0.75	0.81	0.91	.....	.....	.....
					6:10 a. m.	7:00 a. m.	0.03	0.10	0.35	0.76	1.13	1.62	2.00	2.30	2.53	2.79	3.08	.....	.....	.....	.....
Do	29	5:50 a. m.	3:10 p. m.	7.23	7:00 a. m.	7:50 a. m.	.....	3.35	3.57	3.82	4.02	4.16	4.28	4.41	4.67	4.89	5.08	.....	.....	.....	.....
					7:50 a. m.	8:40 a. m.	.....	5.33	5.66	5.90	6.10	6.24	6.27	6.28	6.28	6.33	6.47	.....	.....	.....	.....
					8:40 a. m.	8:55 a. m.	.....	6.63	6.72	6.81	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Peoria, Ill	12	9:22 p. m.	9:40 p. m.	0.41	9:23 p. m.	9:33 p. m.	0.01	0.21	0.38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Philadelphia, Pa	3	.....	.....	0.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.13	.....	.....	.....	.....
Pittsburg, Pa	19–20	D. N.	7:10 a. m.	2.17	3:04 a. m.	3:54 a. m.	0.43	0.09	0.13	0.18	0.25	0.39	0.44	0.48	0.51	0.56	0.58	.....	.....	.....	.....
					3:54 a. m.	4:44 a. m.	.....	0.61	0.68	0.71	0.75	0.78	0.87	0.93	0.97	1.00	1.05	.....	.....	.....	.....
					4:44 a. m.	5:10 a. m.	.....	1.16	1.28	1.35	1.44	1.60	1.66	.....	.....	.....	.....	.....	.....	.....	.....
Portland, Me	22–23	.....	.....	0.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.09	.....	.....	.....
Portland, Oreg	13–14	.....	.....	0.73	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.14	.....	.....	.....
Pueblo, Colo	2–3	.....	.....	0.69	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.34	.....	.....	.....	.....
Raleigh, N. C	3	2:05 p. m.	5:25 p. m.	0.84	2:25 p. m.	2:47 p. m.	0.04	0.11	0.22	0.32	0.51	0.60	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	23	10:05 a. m.	5:10 p. m.	2.03	10:42 a. m.	11:16 a. m.	0.01	0.17	0.50	1.06	1.52	1.62	1.71	1.80	.....	.....	.....	.....	.....	.....	.....
Richmond, Va	13	.....	.....	0.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.14	.....	.....	.....
Rochester, N. Y	29	7:55 p. m.	10:15 p. m.	0.77	8:18 p. m.	8:53 p. m.	0.06	0.07	0.08	0.20	0.27	0.40	0.52	0.55	.....	.....	.....	.....	.....	.....	.....
Sacramento, Cal	23	.....	.....	0.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.11	.....	.....	.....
St. Louis, Mo	28–29	.....	.....	2.15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*	.....	.....	.....
St. Paul, Minn	11	1:05 p. m.	2:35 p. m.	0.53	1:12 p. m.	1:26 p. m.	T.	0.19	0.31	0.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	25	4:35 p. m.	6:35 p. m.	1.62	4:56 p. m.	5:31 p. m.	0.05	0.16	0.27	0.55	0.84	1.10	1.25	1.46	.....	.....	.....	.....	.....	.....	.....
Salt Lake City, Utah	1	6:40 a. m.	4:45 p. m.	0.77	2:08 p. m.	2:28 p. m.	0.15	0.15	0.27	0.34	0.43	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Antonio, Tex	4	.....	.....	0.86	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.28	.....	.....	.....
San Diego, Cal	15	.....	.....	0.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.06	.....	.....	.....
Sandusky, Ohio	22	12:45 p. m.	1:30 p. m.	0.60	12:49 p. m.	12:59 p. m.	0.01	0.24	0.51	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	29	5:30 p. m.	11:30 p. m.	1.94	5:37 p. m.	5:52 p. m.	0.01	0.16	0.27	0.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Cal	23	.....	.....	0.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	*	.....	.....	.....
Savannah, Ga	5	9:00 p. m.	11:15 p. m.	0.70	9:55 p. m.	10:22 p. m.	0.05	0.25	0.28	0.32	0.41	0.59	0.63	.....	.....	.....	.....	.....	.....	.....	.....
Scranton, Pa	2–3	.....	.....	0.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.21	.....	.....	.....
Seattle, Wash	6–7	.....	.....	1.03	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.19	.....	.....	.....
Shreveport, La	24–25	.....	.....	1.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.39	.....	.....	.....
Spokane, Wash	12–13	.....	.....	0.46	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.08	.....	.....	.....
Springfield, Ill	2	12:37 p. m.	1:10 p. m.	0.77	12:48 p. m.	1:06 p. m.	0.01	0.31	0.50	0.64	0.75	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springfield, Mo	27–28	.....	.....	2.13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.42	.....	.....	.....	.....
Syracuse, N. Y	29–30	.....	.....	0.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.26	.....	.....	.....	.....
Tampa, Fla	4	3:55 p. m.	7:12 p. m.	2.49	4:18 p. m.	5:23 p. m.	0.03	0.09	0.20	0.28	0.36	0.45	0.49	0.51	0.76	0.98	1.21	1.74	1.95	.....	.....
Do	27	2:17 p. m.	4:30 p. m.	1.00	2:20 p. m.	2:35 p. m.	0.01	0.23	0.66	0.83	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Taylor, Tex	3–4	8:15 p. m.	7:10 a. m.	1.81	11:27 p. m.	11:42 p. m.	0.38	0.07	0.18	0.31	0.52	0.62	.....	.....	.....	.....	.....	.....	.....	.....	.....
Thomasville, Ga	8	6:15 p. m.	8:15 p. m.	1.85	6:30 p. m.	7:05 p. m.	T.	0.21	0.58	0.96	1.29	1.53	1.73	1.79	.....	.....	.....	.....	.....	.....	.....
Do	30	11:25 a. m.	9:05 p. m.	4.94	2:45 p. m.	4:18 p. m.	0.62	0.11	0.14	0.22	0.40	0.49	0.53	0.56	0.64	0.68	0.71	0.86	1.29	1.56	.....
					6:21 p. m.	7:33 p. m.	2.65	0.24	0.51	0.68	0.89	1.14	1.43	1.61	1.62	1.65	1.81	1.96	2.22	.....	.....
Toledo, Ohio	29–30	.....	.....	1.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.38	.....	.....	.....	.....
Topeka, Kans	11–12	11:33 p. m.	1:20 a. m.	0.45	12:16 a. m.	12:30 a. m.	0.06	0.14	0.22	0.37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Valentine, Nebr	19	.....	.....	1.14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.31	.....	.....	.....	.....
Vicksburg, Miss	2	3:45 p. m.	4:40 p. m.	0.48	3:53 p. m.	4:12 p. m.	0.01	0.13	0.29	0.35	0.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	25–26	2:15 p. m.	7:30 a. m.	1.51	2:48 p. m.	3:08 p. m.	0.16	0.20	0.40	0.62	0.79	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Washington, D. C	22–23	.....	.....	0.21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.18	.....	.....	.....	.....
Wichita, Kans	2–3	10:55 p. m.	D. N.	1.04	11:43 p. m.	12:02 a. m.	0.04	0.19	0.40	0.57	0.64	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wilmington, N. C	1	1:35 a. m.	3:20 a. m.	1.11	1:44 a. m.	2:34 a. m.	0.03	0.13	0.34	0.42	0.51	0.63	0.71	0.81	0.90	0.99	1.07	.....	.....	.....	.....
Wytheville, Va	21	2:55 p. m.	5:40 p. m.	1.50	3:28 p. m.	3:58 p. m.	0.02	0.11	0.33	0.68	1.01	1.20	1.37	.....	.....	.....	.....	.....	.....	.....	.....
Do	30	4:03 p. m.	7:20 p. m.	1.34	4:20 p. m.	4:55 p. m.	0.04	0.11	0.22	0.48	0.72	0.90	1.05	1.11	.....	.....	.....	.....	.....	.....	.....
Yankton, S. Dak	18–19	.....	.....	1.25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.38	.....	.....	.....	.....
San Juan, Porto Rico	22	D. N.	7:10 a. m.	0.48	4:55 a. m.	5:15 a. m.	0.05	0.08	0.25	0.35	0.40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Do	22–23	11:03 p. m.	D. N.	1.69	11:03 p. m.	12:10 a. m.	0.00	0.17	0.27	0.31	0.33	0.37	0.39	0.47	0.66	0.78	0.91	1.25	1.55	.....	.....

[1] On 28th. [2] Ending of excessive rate unknown on account of defective record; the five-minute and other amounts partly estimated.
* Self-register not working. † Estimated. ‡ Raingage blown over.

RAINFALL IN JAMAICA.

Through the kindness of Dr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table:

The rainfall for September was therefore much above the average for the whole island. The greatest fall, 24.60 inches, was recorded at Chudleigh, in the west-central division; while the least, 1.33 inches, fell at Arcadia in the northern division.

Comparative table of rainfall.

[Based upon the average stations only.]

SEPTEMBER, 1906.

Divisions.	Relative area.	Number of stations.	Rainfall. 1906.	Rainfall. Average.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	23	14.29	8.94
Northern division	22	43	6.11	5.06
West-central division	26	22	12.45	10.89
Southern division	27	34	9.96	6.73
Means	100		10.70	7.91

TABLE V.—*Data furnished by the Canadian Meteorological Service, September, 1906.*

Stations.	Pressure, in inches.			Temperature.				Precipitation.			Stations.	Pressure, in inches.			Temperature.				Precipitation.		
	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total snowfall.		Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hours.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Total snowfall.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*		*Ins.*	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	Parry Sound, Ont	29.38	30.06	+.03	61.6	+ 5.6	72.8	50.5	3.59	—0.08	
Sydney, C. B. I.	29.93	29.97	—.04	55.6	— 0.9	64.7	46.5	1.96	—1.32		Port Arthur, Ont	29.32	30.03	+.05	57.6	+ 5.4	67.1	48.2	1.15	—2.33	
Halifax, N. S.	29.93	30.03	—.01	57.3	— 0.3	67.6	47.0	3.38	—0.33		Winnipeg, Man	29.13	29.95	+.01	60.8	+ 8.3	74.7	46.9	1.51	—0.52	
Grand Manan, N. B	29.96	30.01	—.02	57.8	+ 1.7	64.5	51.2	1.97	—1.20		Minnedosa, Man	28.12	29.91	—.03	58.6	+ 8.1	73.7	43.5	1.60	+0.24	
Yarmouth, N. S	29.99	30.06	+.01	55.5	— 0.6	62.8	48.2	2.87	—0.58		Qu'Appelle, Sask	27.66	29.89	—.03	57.2	+ 6.1	70.7	43.8	2.75	+1.42	
Charlottetown, P. E. I.	29.94	29.98	—.03	56.6	— 0.7	64.3	48.9	3.00	—0.40		Medicine Hat, Alberta	27.60	29.85	—.07	60.4	+ 5.4	74.0	46.9	0.05	—1.13	
Chatham, N. B	29.93	29.95	—.05	56.8	+ 1.4	67.5	46.0	3.23	+0.52		Swift Current, Sask	27.38	29.93	+.01	56.9	+ 3.8	70.1	43.7	1.46	+0.24	
Father Point, Que	29.93	29.95	—.03	49.6	— 0.8	56.5	42.7	5.21	+2.08		Calgary, Alberta	26.39	29.90	—.02	51.4	+ 1.6	65.1	37.6	0.04	—1.32	
Quebec, Que	29.70	30.02	+.01	55.8	+ 0.7	65.2	46.1	3.46	—0.21		Banff, Alberta	25.36	29.91	—.02	49.3	+ 3.5	61.2	37.4	0.54	—1.13	
Montreal, Que	29.83	30.03	—.01	61.1	+ 2.7	69.2	52.9	3.32	+0.02		Edmonton, Alberta	27.59	29.86	—.04	52.8	+ 3.5	64.3	41.4	0.54	—0.79	
Rockliffe, Ont.	29.47	30.07	+.04	59.8	+ 4.1	72.2	47.1	2.21	—1.07		Prince Albert, Sask	28.29	29.84	—.06	51.4	+ 3.0	62.2	40.7	1.32	+0.04	
Ottawa, Ont	29.70	30.02	—.02	62.4	+ 5.0	73.8	51.0	2.37	—0.32		Battleford, Sask	28.11	29.83	—.07	55.0	+ 3.2	67.1	42.8	0.80	—0.45	
Kingston, Ont.	29.77	30.08	+.04	63.5	+ 3.5	72.6	54.4	2.60	—0.20		Kamloops, B. C.	28.66	29.87	—.10	60.2	+ 2.8	70.9	49.4	0.61	—0.24	
Toronto, Ont	29.70	30.07	+.01	64.9	+ 3.9	75.2	54.5	3.67	+0.42		Victoria, B. C.	29.89	29.98	—.03	56.4	+ 1.6	63.3	49.6	3.14	+0.98	
White River, Ont	28.76	30.06	+.08	54.0	+ 3.7	66.6	41.5	0.55	—2.22		Barkerville, B. C.	25.63	29.94	—.04	42.9	— 3.8	50.3	35.4	7.46	+4.55	
Port Stanley, Ont	29.44	30.08	+.02	63.3	+ 3.8	73.0	53.7	2.40	—0.33		Hamilton, Bermuda	29.90	30.06	—.01	78.1	+ 0.7	82.9	73.2	3.82	—2.69	
Saugeen, Ont	29.38	30.08	+.03	63.4	+ 5.9	72.6	54.1	4.26	+1.32		Dawson, Yukon	.....	.....	.....	.....	.....	.....	.....	.....	.....	

TABLE VI.—*Heights of rivers referred to zeros of gages, September, 1906.*

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.	Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.						Height.	Date.	Height.	Date.		
Milk River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*	*Little Kanawha River.*	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Havre, Mont	237	9	2.5	1-4	2.3	22-30	2.4	0.2	Glenville, W. Va	77	20	2.4	30	—0.6	8	0.6	3.0
Yellowstone River.									Creston, W. Va.	38	20	3.9	30	1.6	6	2.4	2.3
Billings, Mont.	330	8	1.7	1-4	1.1	28-30	1.4	0.6	*New-Great Kanawha River.*								
Cheyenne River.									Radford, Va	213	14	5.0	1	0.6	12	2.2	4.4
Rousseau, S. Dak	7	9	4.6	19	0.3	11, 14, 15	1.4	4.3	Hinton, W. Va.	153	14	4.4	1	2.3	18, 19	3.1	2.1
James River.									Charleston, W. Va.	58	30	9.0	29	4.6	11-13	6.7	4.4
Lamoure, N. Dak	330	14	0.5	1, 2	0.2	28-30	0.3	0.3	*Scioto River.*								
Huron, S. Dak	139	9	1.0	18-21	0.6	2-4	0.8	0.4	Columbus, Ohio	110	17	2.6	1, 2	0.6	16-29	1.3	2.0
Republican River.									*Licking River.*								
Clay Center, Kans.	42	18	6.7	18, 19	5.2	8-11	5.8	1.5	Falmouth, Ky.	30	25	7.0	10	1.8	1, 2, 20	3.1	5.2
Smoky Hill-Kansas River.									*Miami River.*								
Abilene, Kans.	277	22	3.8	21	0.1	13-15, 28-30	0.9	3.7	Dayton, Ohio	77	18	1.1	1	0.6	14-17	0.8	0.5
Manhattan, Kans.	116	18	8.9	19	1.8	30	3.6	7.1	*Kentucky River.*								
Topeka, Kans	87	21	9.2	22	5.9	13-15	6.7	3.3	Jackson, Ky	287	24	8.2	6	4.5	{20-22, 25-26, 30}	5.2	3.7
Missouri River.									Beattyville, Ky	254	30	3.2	6	0.4	21, 22, 29	1.2	2.8
Townsend, Mont	2,504	11	4.0	16, 17	3.5	9, 12	3.7	0.5	High Bridge, Ky.	117	17	11.9	10	9.4	20, 22	10.1	2.5
Fort Benton, Mont	2,285	12	0.4	25-27	0.1	2, 3	0.3	0.3	Frankfort, Ky.	65	31	8.5	30	6.0	19, 21	6.6	2.5
Wolfpoint, Mont.	1,952	17	—0.4	18, 19	—1.5	3, 4	—1.1	1.1	*Wabash River.*								
Bismarck, N. Dak.	1,309	14	3.5	1	0.3	30	1.3	3.2	Mount Carmel, Ill.	75	15	2.9	1	1.0	25	1.7	1.9
Pierre, S. Dak.	1,114	14	3.4	5	1.3	2	2.1	2.1	*Cumberland River.*								
Sioux City, Iowa	784	19	9.1	25	6.8	7, 8	8.0	2.3	Burnside, Ky.	518	50	11.1	11	1.0	21	3.7	10.1
Omaha, Nebr.	669	18	9.0	18, 21	6.9	9	8.1	2.1	Celina, Tenn.	383	45	11.5	12, 13	3.2	3	6.4	8.3
St. Joseph, Mo	481	10	6.2	20	1.8	11	3.9	4.4	Carthage, Tenn.	308	40	10.5	23	2.8	4	6.5	7.7
Kansas City, Mo.	388	21	12.9	23	7.8	12	10.2	5.1	Nashville, Tenn	196	40	15.7	24	8.8	4	11.5	6.9
Glasgow, Mo.	231	18	9.7	24	5.4	16	7.2	4.3	Clarksville, Tenn.	126	42	21.3	29	5.0	4, 5	11.0	16.3
Boonville, Mo.	199	20	13.6	23	9.4	15	11.2	4.2	*Powell River.*								
Hermann, Mo.	103	24	10.9	26	7.6	16	8.8	3.3	Tazewell, Tenn.	44	20	5.6	1	0.3	25-28	1.5	5.3
Minnesota River.									*Clinch River.*								
Mankato, Minn.	127	18	7.4	1, 5	5.4	15-18	6.5	2.0	Speers Ferry, Va.	156	20	2.0	6, 22	0.0	20	0.8	2.0
St. Croix River.									Clinton, Tenn	52	25	10.0	7	4.0	22	6.0	6.0
Stillwater, Minn.	23	11	9.0	1-4	6.5	13-15, 18-22	7.5	2.5	*South Fork Holston River.*								
Chippewa River.									Bluff City, Tenn.	35	12	3.2	5	0.8	20, 21	1.5	2.4
Chippewa Falls, Wis.	75	16	6.8	24	1.4	2, 9	2.7	5.4	*Holston River.*								
Red Cedar River.									Rogersville, Tenn.	103	14	5.6	6	2.0	18, 19	3.1	3.6
Cedar Rapids, Iowa	77	14	4.8	25, 26	3.2	4, 16	3.8	1.6	*French Broad River.*								
Des Moines River.									Asheville, N. C.	144	4	5.7	19	0.4	17	2.0	5.3
Des Moines, Iowa	205	19	5.7	22	2.9	13-17	3.7	2.8	Leadvale, Tenn.	70	12	6.5	19	0.8	17	3.3	5.7
Illinois River.									*Little Tennessee River.*								
La Salle, Ill	197	18	12.6	30	11.2	17-19	11.7	1.4	McGhee, Tenn.	17	20	8.9	30	3.6	18	5.5	5.3
Peoria, Ill.	135	14	8.6	3-7	7.4	22, 26	8.0	1.2	*Hiwassee River.*								
Clarion River.									Charleston, Tenn	18	22	6.9	30	2.0	15, 18, 28	3.7	4.9
Clarion, Pa.	32	10	2.0	4	0.2	22	0.7	1.8	*Tennessee River.*								
Conemaugh River.									Knoxville, Tenn.	635	12	10.9	20	1.9	19	4.9	9.0
Johnstown, Pa.	64	7	1.1	14	0.6	30	0.9	0.5	Loudon, Tenn.	590	25	8.0	21	2.5	18	4.8	5.5
Allegheny River									Kingston, Tenn.	556	25	7.3	21	2.6	18, 19	4.8	4.7
Warren, Pa	177	14	0.3	30	— 0.6	17-20	—0.3	0.9	Chattanooga, Tenn.	452	33	13.0	1	4.8	19	8.2	8.2
Franklin, Pa	114	15	1.5	5	0.1	19, 20	0.6	1.4	Bridgeport, Ala	402	24	9.7	2	3.1	19	6.3	6.6
Parker, Pa.	73	20	1.5	5	0.2	19, 20	0.7	1.3	Guntersville, Ala.	349	31	12.7	23	6.5	18, 19	9.8	6.2
Freeport, Pa.	29	20	3.2	6	1.1	19	2.0	2.1	Florence, Ala.	255	16	9.3	30	3.3	19	6.0	6.0
Springdale, Pa.	17	27	7.7	21	6.0	19	6.7	1.7	Riverton, Ala.	225	26	15.3	30	5.8	19	9.5	9.5
Cheat River.									Johnsonville, Tenn.	95	21	11.9	30	5.2	21	8.5	6.7
Rowlesburg, W. Va.	36	14	2.8	29	0.9	27	1.5	1.9	*Ohio River.*								
Youghiogheny River.									Pittsburg, Pa.	906	22	6.6	20	5.3	21	6.1	1.3
Confluence, Pa.	89	10	1.1	1	0.2	25-30	0.5	0.9	Davis Island Dam, Pa.	960	25	4.3	20	2.4	19	3.1	1.9
West Newton, Pa.	15	23	0.8	1, 2	0.0	15-30	0.4	0.8	Beaver Dam, Pa	925	27	5.0	21	3.0	19, 20	3.9	2.0
Monongahela River.									Wheeling, W. Va.	875	36	4.7	1	2.7	13	3.4	2.0
Weston, W. Va.	161	18	0.0	14	— 1.2	9-13, 24-26	—0.8	1.2	Parkersburg, W. Va	785	36	6.3	1	3.0	15	4.1	3.3
Fairmont, W. Va.	119	25	15.3	30	13.5	28	14.2	1.8	Point Pleasant, W. Va.	703	39	10.0	1	2.5	19, 20	4.5	7.5
Greensboro, Pa	81	18	7.9	30	6.8	21-28	7.0	1.1	Huntington, W. Va	660	50	13.9	1	5.4	20, 21	7.9	8.5
Lock No. 4, Pa.	40	28	8.5	30	6.5	6	7.2	2.0	Catlettsburg, Ky.	651	50	13.0	1	3.6	21	6.7	9.4
Beaver River.									Portsmouth, Ohio	612	50	13.4	2	4.9	21	7.9	8.5
Ellwood Junction, Pa.	10	14	2.5	1	0.7	19	1.5	1.8	Maysville, Ky.	559	50	13.9	3	5.0	22	7.9	8.9
Muskingum River.									Cincinnati, Ohio.	499	50	15.8	4	7.1	22	10.1	8.7
Zanesville, Ohio	70	25	9.0	6	7.8	15-17	8.1	1.2	Madison, Ind	413	46	12.6	4	6.0	18	8.9	6.6
Beverly, Ohio.	20	25	6.0	6	3.8	20	4.8	2.2	Louisville, Ky.	367	28	6.3	5	3.1	20	4.5	3.2

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Ohio River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Evansville, Ind	184	35	13.3	1	5.1	21	8.5	8.2
Mount Vernon, Ind	148	35	12.9	1	4.4	22	8.1	8.5
Paducah, Ky	47	40	11.9	1	6.5	22	9.9	5.4
Cairo, Ill	1	45	19.9	1	13.6	23	17.0	6.3
St. Francis River.								
Marked Tree, Ark	104	17	6.0	30	2.8	25	4.0	3.2
Neosho River.								
Neosho Rapids, Kans	326	22	3.9	20	0.7	10	1.2	3.2
Iola, Kans	262	10	1.0	22	0.0	1	0.4	1.0
Oswego, Kans	184	20	4.1	6	0.5	{1, 2, 21–23, 30}	1.9	3.6
Fort Gibson, Ind. T	3	22	15.0	16, 17	10.4	7	11.6	4.6
Canadian River.								
Calvin, Ind. T	99	10	11.1	12	2.2	30	3.4	8.9
Black River.								
Blackrock, Ark	67	12	13.2	30	2.6	25, 26	4.2	10.6
White River.								
Calicorock, Ark	272	15	12.9	30	0.8	27	2.7	12.1
Batesville, Ark	217	18	13.1	30	3.0	25, 27	4.7	10.1
Newport, Ark	185	26	14.0	30	2.9	25, 26	5.3	11.1
Clarendon, Ark	75	30	20.1	2, 3	11.8	26, 27	15.2	8.3
Arkansas River.								
Pueblo, Colo. (4)	1334	10	3.6	3, 18				
Wichita, Kans	832	10	4.0	20	— 1.0	6, 7	0.4	5.0
Tulsa, Ind. T	551	16	8.0	20	3.6	1	5.1	4.4
Webbers Falls, Ind. T	465	23	9.5	7	6.0	3	7.3	3.5
Fort Smith, Ark	403	22	14.0	14	6.5	4	9.0	7.5
Dardanelle, Ark	256	21	13.8	15	6.3	30	8.6	7.5
Little Rock, Ark	176	23	13.8	16	7.5	5	9.7	6.3
Pine Bluff, Ark	121	23	16.0	17, 18	10.0	6	12.3	6.0
Yazoo River.								
Greenwood, Miss	175	38	13.5	30	2.2	4, 18	3.6	11.3
Yazoo City, Miss	80	25	8.3	30	— 1.3	21–23	0.2	9.6
Ouachita River.								
Camden, Ark	304	39	7.0	1	5.0	7	5.7	2.0
Monroe, La	122	40	4.9	27	3.2	24, 25	3.8	1.7
Red River								
Arthur City, Tex	688	27	17.0	22	8.6	2	13.1	8.4
Fulton, Ark	515	28	20.8	24	12.4	4, 5	17.1	8.4
Shreveport, La	327	29	12.4	25	6.2	7	9.8	6.2
Alexandria, La	118	33	14.4	28, 29	7.7	11	11.7	6.7
Mississippi River.								
Fort Ripley, Minn	2,082	10	6.8	26	5.0	10, 13, 14	5.7	1.8
St. Paul, Minn	1,954	14	8.4	1, 2	6.2	17–20	7.2	2.2
Red Wing, Minn	1,914	14	6.1	4–6	4.6	17, 18	5.3	1.5
Reeds Landing, Minn	1,884	12	5.8	6	4.5	15, 16	5.1	1.3
La Crosse, Wis	1,819	12	6.7	5–8	5.8	15–17, 24–26	6.2	0.9
Prairie du Chien, Wis	1,759	18	7.4	11, 12	6.6	18, 19, 28–30	7.0	0.8
Dubuque, Iowa	1,699	18	7.4	13	6.3	1	7.0	1.1
Clinton, Iowa	1,629	16	6.6	5–16	5.5	1	6.4	1.1
Leclaire, Iowa	1,609	10	4.4	5–16, 24	3.7	1	4.3	0.7
Davenport, Iowa	1,593	15	5.8	6–15	4.9	1	5.6	0.9
Muscatine, Iowa	1,562	16	6.8	8, 9	5.8	1	6.4	1.0
Galland, Iowa	1,472	8	3.2	30	2.5	2	2.9	0.7
Keokuk, Iowa	1,463	15	5.6	29, 30	4.5	1–3	5.0	1.1
Warsaw, Ill	1,458	18	8.0	25, 26, 29, 30	7.3	5	7.9	0.7
Hannibal, Mo	1,402	13	6.6	29, 30	5.3	3–6	5.8	1.3
Grafton, Ill	1,306	23	8.4	30	7.0	5–7	7.3	1.4
St. Louis, Mo	1,264	30	12.2	29, 30	8.6	16, 19	9.7	3.6
Chester, Ill	1,189	30	10.7	30	7.5	18, 19	8.4	3.2
New Madrid, Mo	1,008	34	16.1	1	11.3	24	13.8	4.8
Luxora, Ark	905	33	9.0	1	6.3	20, 21	7.4	2.7
Memphis, Tenn	843	33	12.7	2, 3	7.7	25, 26	10.5	5.0
Helena, Ark	767	42	17.6	3, 4	11.8	26, 27	15.0	5.8
Arkansas City, Ark	635	42	22.5	3, 4	16.2	27	19.6	6.3
Greenville, Miss	595	42	18.3	4	13.1	27	15.9	5.2
Vicksburg, Miss	474	45	19.6	6	14.6	29, 30	17.0	5.6
Natchez, Miss	373	46	21.2	5–7	16.6	30	19.3	4.6
Baton Rouge, La	240	35	13.0	7, 8	10.3	22	11.9	2.7
Donaldsonville, La	188	28	9.4	27	7.6	30	8.5	1.8
New Orleans, La	108	16	8.4	27	5.7	20	6.2	2.7
Atchafalaya River.								
Simmesport, La	127	33	16.9	1	14.2	20, 21, 30	15.3	2.7
Melville, La	103	31	20.4	1	17.9	22	19.0	2.5
Morgan City, La	19	8	5.5	28	2.5	1	4.0	3.0
Grand River.								
Grand Rapids, Mich	38	11	1.9	30	1.2	9, 10, 14	1.4	0.7
Sandusky River.								
Tiffin, Ohio	65	8	0.6	30	— 0.1	19–21	0.1	0.7
Connecticut River.								
Hartford, Conn	50	16	2.5	1, 23, 25	1.0	17	2.0	1.5
Mohawk River.								
Tribeshill, N. Y	42	12	0.4	4, 29, 30	— 0.6	12–21	— 0.2	1.0
Schenectady, N. Y	19	15	7.7	1, 4, 28–30	4.4	18–21	0.6	3.3
Hudson River.								
Troy, N. Y	154	14	4.5	3	1.5	29, 30	3.0	3.0
Albany, N. Y	147	12	4.4	21	1.4	12, 13, 15	2.8	3.0
Pompton River.								
Pompton Plains, N. J	6	8	4.3	23	3.4	11–19	3.7	0.9
Passaic River.								
Chatham, N. J	69	7	2.3	1	2.0	15–22, 25–27	2.1	0.3
Lehigh River.								
Mauch Chunk, Pa	45	15	4.6	4	4.2	10, 11, 14–28	4.3	0.4
Schuylkill River.								
Reading, Pa	66	12	1.0	13	— 0.1	12	0.2	1.1
Delaware River.								
Hancock (E. Branch), N. Y.	269	12	3.4	1, 4	2.7	16–20	3.0	0.7
Hancock (W. Branch), N. Y.	269	10	3.5	21	2.5	17, 19	3.0	1.0
Port Jervis, N. Y	204	14	0.8	1	0.0	11–13, 28–30	0.3	0.8
Phillipsburg, N. J	142	26	1.7	1	0.5	17, 19–22	0.9	1.2
Trenton, N. J	92	18	1.8	1	0.7	21–26	1.1	1.1

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
North Branch Susquehanna.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Binghamton, N. Y	183	16	2.4	1	1.8	16, 19, 20	2.0	0.6
Towanda, Pa	139	16	1.5	1	0.6	14–22	0.8	0.9
Wilkes-Barre, Pa	80	17	4.1	1	2.5	19, 20, 24, 25	2.9	1.6
West Branch Susquehanna.								
Renovo, Pa	90	16	2.3	5	0.4	12, 19	0.8	1.9
Williamsport, Pa	39	20	2.7	4	0.8	12	1.3	1.9
Juniata River.								
Huntingdon, Pa	90	24	3.4	4	3.0	{17–20, 22, 24–30}	3.1	0.4
Susquehanna River.								
Harrisburg, Pa	69	17	2.5	5	0.9	24, 25	1.4	1.6
Shenandoah River.								
Riverton, Va	58	22	1.2	1	—0.5	20–30	—0.3	1.7
Potomac River.								
Cumberland, Md	290	8	4.0	1–6	2.3	28–30	3.2	1.7
Harpers Ferry, W. Va	172	18	4.0	1	—0.2	23–25	0.9	4.2
James River.								
Buchanan, Va	305	12	4.3	1	2.5	10, 12	3.0	1.8
Lynchburg, Va	260	18	3.3	1	1.2	20–22	1.8	2.1
Columbia, Va	167	18	8.2	1	3.4	21, 22	4.5	4.8
Richmond, Va	111	12	1.8	1	0.2	30	0.7	1.6
Dan River.								
Danville, Va	55	8	1.0	1, 2	0.0	11, 12	0.4	1.0
Roanoke River.								
Clarksville, Va	196	12	4.6	1	0.2	29	1.0	4.4
Weldon, N. C	129	30	28.9	1	9.9	30	12.4	19.0
Tar River.								
Tarboro, N. C	46	25	21.6	4	2.6	28, 29	7.0	19.0
Greenville, N. C	21	22	14.8	5	4.2	25	7.6	10.6
Haw River.								
Moncure, N. C	171	25	15.7	1	8.4	{11, 13, 18, 23, 27–30}	9.0	7.3
Cape Fear River.								
Fayetteville, N. C	112	38	38.6	1	3.9	30	9.5	34.7
Waccamaw River.								
Conway, S. C	40	7	6.3	9–11	3.8	25, 26, 28–30	5.2	2.5
Pedee River.								
Cheraw, S. C	149	27	31.8	1	3.9	14	9.1	27.9
Smiths Mills, S. C	51	16	16.0	9, 10	8.6	27	12.2	7.4
Lynch Creek.								
Effingham, S. C	35	12	10.0	1, 6	4.3	18	7.4	5.7
Black River.								
Kingstree, S. C	45	12	10.0	2	3.3	17, 18	7.0	6.7
Catawba-Wateree River.								
Mount Holly, N. C	143	15	8.0	20	2.2	10–13	3.0	5.8
Catawba, S. C	107	11	12.2	1	2.4	13	4.3	9.8
Camden, S. C	54	24	28.6	1	8.0	17	13.1	20.6
Broad River.								
Blairs, S. C	36	14	8.2	1	1.1	18	3.3	7.1
Saluda River.								
Pelzer, S. C	109	7	6.7	20	3.4	8	4.6	3.3
Chappels, S. C	56	14	12.4	1	3.2	17	7.4	9.2
Congaree River.								
Columbia, S. C	52	15	12.4	1	1.4	17	3.8	11.0
Santee River.								
Rimini, S. C	108	10	16.7	5	10.6	13, 17, 18	13.1	6.1
St. Stephens, S. C	50	10	10.7	8, 9	8.5	17	9.1	2.2
Edisto River.								
Edisto, S. C	75	6	4.9	1	2.6	17–19	3.9	2.3
Broad River.								
Carlton, Ga	30	11	8.2	20	2.5	16, 17	3.5	5.7
Savannah River.								
Calhoun Falls, S. C	347	15	9.8	20	3.0	10, 11	4.8	6.8
Augusta, Ga	268	32	23.3	21	9.1	12	13.5	14.2
Oconee River.								
Milledgeville, Ga	147	25	9.0	21	2.7	10	4.9	6.3
Dublin, Ga	79	30	7.5	2	0.7	12, 13	3.0	6.8
Ocmulgee River.								
Macon, Ga	203	18	9.8	22	2.2	18	5.2	7.6
Abbeville, Ga	96	11	8.3	4, 5	3.0	13, 20, 21	5.9	5.3
Flint River.								
Woodbury, Ga	227	10	3.6	6	0.4	18	1.2	.2
Montezuma, Ga	152	20	11.7	10	4.0	21, 25–27	6.0	7.7
Albany, Ga	90	20	10.2	11	1.7	22	4.8	8.5
Bainbridge, Ga	29	22	11.3	12	4.8	22, 23	7.0	6.5
Chattahoochee River.								
Oakdale, Ga	305	18	10.5	1, 20, 30	3.0	17	6.2	7.5
West Point, Ga	239	20	11.2	6	3.3	18, 19	5.3	7.9
Eufaula, Ala	90	40	17.5	10	4.0	19	9.2	13.5
Alaga, Ala	30	25	22.2	8	4.9	20	9.9	17.3
Coosa River.								
Rome, Ga	266	30	6.4	20	2.3	17, 18	3.9	4.1
Gadsden, Ala	162	22	6.9	11	2.4	19	4.7	4.5
Lock No. 4, Ala	113	17	7.0	30	2.0	19, 20	4.0	5.0
Wetumpka, Ala	12	45	22.4	30	5.5	20	10.1	16.9
Tallapoosa River.								
Milstead, Ala	42	35	16.0	7	2.4	19	5.3	13.6
Alabama River.								
Montgomery, Ala	323	35	19.1	30	3.3	20	7.3	15.8
Selma, Ala	246	35	22.7	30	4.3	21	8.8	18.4
Black Warrior River.								
Tuscaloosa, Ala	90	43	48.5	30	5.7	21	9.6	42.8
Tombigbee River.								
Columbus, Miss	316	33	8.5	29	— 3.0	16–21	—1.6	11.5
Vienna, Ala	246	42	16.0	30	1.0	14–16	2.3	15.0
Demopolis, Ala	168	35	23.2	30	0.0	23	2.9	23.2
Pascagoula River.								
Merrill, Miss	78	20	19.4	30	1.4	5, 19	4.4	18.0
Pearl River.								
Columbia, Miss	110	14	18.0	30	3.4	1–5	5.3	14.6
Sabine River.								
Logansport, La	315	25	7.0	15	2.9	30	5.8	4.1

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Neches River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Rockland, Tex	105	20	2.1	4–6	0.0	21	1.2	2.1
Beaumont, Tex	18	10	1.8	29	0.9	1	1.3	0.9
Trinity River.								
Dallas, Tex	320	25	27.1	7	5.2	2	12.0	21.9
Long Lake, Tex	211	35	21.2	14	5.5	6	11.7	15.7
Riverside, Tex	112	40	10.8	16	2.8	30	6.0	8.0
Liberty, Tex	20	25	13.3	1	6.5	6	9.1	6.8
Brazos River.								
Kopperl, Tex	345	21	3.2	8	0.4	14, 15	1.6	2.8
Waco, Tex	285	24	9.1	8	4.0	2, 3	5.7	5.1
Valley Junction, Tex	215	40	10.3	7	3.0	3	5.5	7.3
Hempstead, Tex	140	40	10.4	10	1.0	5	4.1	9.4
Booth, Tex	61	39	5.8	23	4.2	1–9, 28–30	4.7	1.6
Colorado River.								
Ballinger, Tex	489	21	17.0	2	1.8	1, 26	3.3	15.2
Austin, Tex	214	18	8.4	7	2.5	30	5.1	5.9
Columbus, Tex	98	24	18.0	13	8.5	6	11.3	9.5
Guadalupe River.								
Gonzales, Tex	112	22	1.8	22, 23	0.4	3–6	0.8	1.4
Victoria, Tex	53	16	3.1	24	0.7	6	1.3	2.4
Rio Grande River.								
San Marcial, N. Mex.(1)	1,253	14	11.6	28	5.9	12	7.2	5.7
Rio Grande River—Cont'd.								
El Paso, Tex.(t)	1,030	14	6.1	1	5.0	23, 24	5.4	1.1
Red River of the North.								
Moorhead, Minn	284	26	11.1	1	9.9	13–19	10.3	1.2
Kootenai River.								
Bonners Ferry, Idaho	123	24	3.5	1	1.5	30	2.5	2.0
Pend d'Oreille River.								
Newport, Wash.	86	14	0.1	1	−1.0	30	−0.5	1.1
Snake River.								
Lewiston, Idaho	144	24	0.6	19–24	−0.3	1–3, 7–9	0.1	0.9
Riparia, Wash.	67	30	1.4	1, 2	1.0	6-14, 17-30	1.1	0.4
Columbia River.								
Wenatchee, Wash	473	40	12.8	15	9.2	30	10.9	3.6
Umatilla, Oreg.	270	25	5.3	15, 16	3.6	29, 30	4.4	1.7
The Dalles, Oreg.	166	40	7.1	16, 17	4.3	30	5.7	2.8
Willamette River.								
Albany, Oreg.	118	20	1.8	16, 17	0.7	{7–12, 24, } { 29, 30 }	0.9	1.1
Salem, Oreg	84	20	1.2	16	−0.5	5–8	−0.1	1.7
Portland, Oreg.	12	15	4.9	20	1.8	12	3.4	3.1
Sacramento River.								
Red Bluff, Cal.	201	23	0.7	1–5, 14–16	0.4	29, 30	0.6	0.3
Sacramento, Cal.	64	25	8.8	1	7.6	23–26	8.0	1.2

(g) No flow 7 days. (l) No current 12 days. (t) Water below gage 20 days.

Honolulu, T. H., latitude 21° 19′ north, longitude 157° 52′ west; barometer above sea, 38 feet; gravity correction, —0.057 inch, applied. September, 1906.

Day.	Pressure.*		Air temperature.				Moisture.				Wind.				Precipitation.		Clouds.					
							8 a. m.		8 p. m.		8 a. m.		8 p. m.				8 a. m.			8 p. m.		
	8 a. m.	8 p. m.	8 a. m.	8 p. m.	Maximum.	Minimum.	Wet.	Relative humidity.	Wet.	Relative humidity.	Direction.	Velocity.	Direction.	Velocity.	8 a. m.	8 p. m.	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.
1	30.02	30.01	77.2	75.0	83	73	68.0	62	68.8	73	ne.	6	ne.	15	0.02	0.08	4	Cu.	e.	6	Cu.	e.
2	30.00	29.97	78.7	77.0	84	74	69.3	62	69.0	67	ne.	14	ne.	14	0.02	T.	1	Cu.	e.	{1	A.-s.	sw.
																				{6	Cu.	e.
3	29.99	30.00	79.4	77.0	83	72	71.0	66	70.0	71	ne.	9	e.	6	0.11	T.	8	Cu.	e.	{1	A.-s.	sw.
																				{8	S.	ne.
4	30.00	29.98	78.0	77.7	84	74	69.0	63	69.5	66	ne.	9	ne.	12	0.01	0.00	{1	Cl.	0	1	A.-s.	0
																	{3	Cu.	e.	3	Cu.	e.
5	30.00	29.99	78.2	78.0	85	73	72.4	76	72.0	75	ne.	6	ne.	8	0.05	T.	7	Cu.	e.	2	Cu.	e.
6	29.98	29.96	79.5	76.8	84	75	73.0	74	72.8	83	ne.	7	e.	9	0.01	0.06	8	Cu.	ne.	8	N.	e.
7	29.96	29.98	77.0	79.0	85	72	71.5	77	71.5	69	e.	4	e.	7	0.14	0.05	6	N.	e.	0	0	0
8	30.01	30.02	80.2	78.0	85	76	71.4	65	71.0	71	ne.	4	ne.	4	0.00	T.	{3	Cl.	sw.	{6	N.	e.
																	{2	Cu.	e.			
9	30.02	30.01	77.0	77.5	82	75	69.0	67	68.5	63	ne.	10	se.	8	T.	0.00	8	Cu.	e.	0	0	0
10	29.99	30.00	79.2	78.0	83	75	68.0	56	69.5	65	ne.	14	e.	7	0.00	0.00	1	Cu.	e.	0	0	0
11	30.02	30.02	79.5	78.0	84	75	68.3	56	69.5	65	e.	15	ne.	8	0.00	0.00	2	Cu.	ne.	2	S.	e.
12	30.07	30.08	80.0	73.0	84	73	69.0	57	68.0	78	ne.	6	e.	14	0.00	0.04	{2	Cl.	0	{7	N.	e.
																	{3	Cu.	e.			
13	30.05	30.04	75.4	78.0	83	74	70.0	76	70.0	67	ne.	8	ne.	10	0.03	T.	8	N.	e.	1	Cu.	e.
14	30.02	30.02	78.4	78.0	84	69	71.0	69	71.0	71	e.	6	ne.	5	0.32	0.00	5	Cu.	e.	2	Cu.	e.
15	30.05	30.04	81.5	76.5	85	74	71.4	61	70.0	72	ne.	4	e.	2	0.00	0.02	1	Cu.	e.	2	Cu.	e.
16	30.06	30.02	78.5	77.0	82	74	70.0	66	69.0	67	ne.	14	ne.	4	0.02	T.	8	Cu.	e.	3	S.	e.
17	29.99	29.96	79.0	76.5	83	74	71.4	69	70.0	72	e.	8	ne.	14	0.00	0.00	7	Cu.	e.	0	0	0
18	29.97	29.94	77.5	76.5	84	73	71.0	72	69.0	68	ne.	4	se.	4	T.	0.00	6	Cu.	e.	few.	Cu.	e.
19	29.93	29.88	75.5	76.5	83	73	70.0	76	69.5	70	e.	4	ne.	5	0.01	0.00	{1	Cl.-cu.	sw.	1	Cu.	e.
																	{5	Cu.	e.			
20	29.88	29.88	79.0	76.0	83	70	69.5	62	69.0	70	n.	3	ne.	14	T.	0.00	{2	Cl.	N.	0	0	0
																	{1	Cu.	e.			
21	29.92	29.94	77.3	76.0	82	72	70.5	72	71.0	78	sw.	3	ne.	10	0.00	0.07	1	Cu.	e.	2	Cu.	e.
22	29.97	29.96	78.0	77.0	84	73	70.5	69	70.0	71	s.	4	ne.	8	0.00	0.00	{4	Cl.-cu.	s.	0	0	0
																	{1	Cu.	e.			
23	30.03	30.02	80.0	78.5	85	73	72.0	68	72.0	73	ne.	2	se.	3	0.00	0.00	{4	Cl.	N.	2	A.-s.	n.
																	{1	Cu.	e.	1	Cu.	e.
24	30.06	30.03	81.0	78.5	85	76	72.0	64	71.0	69	e.	6	ne.	6	0.00	0.00	2	Cu.	e.	2	Cu.	e.
25	30.02	30.01	82.0	78.5	85	75	72.0	61	71.0	69	ne.	5	e.	14	0.00	0.00	2	Cu.	e.	few.	Cu.	e.
26	30.01	30.01	80.0	78.5	85	75	71.0	64	70.0	66	ne.	10	ne.	5	T.	0.00	{1	Cl.	0.	2	Cu.	e.
																	{2	Cu.	e.			
27	30.01	30.00	80.5	77.0	83	74	69.0	56	70.5	72	ne.	6	ne.	12	0.00	T.	5	Cu.	e.	9	N.	e.
28	29.98	29.95	79.0	76.0	83	72	70.5	66	71.0	78	e.	9	se.	5	0.09	0.03	3	Cu.	e.	8	N.	e.
29	29.98	29.99	80.0	76.0	84	74	70.5	62	69.5	70	e.	5	ne.	10	0.01	0.00	1	Cu.	e.	1	S.-cu.	e.
30	30.02	30.02	80.0	76.5	84	72	69.5	59	69.5	70	s.	4	ne.	3	0.00	0.00	2	Cu.	e.	1	Cu.	e.
31																						
Mean	30.000	29.991	78.9	77.1	83.8	73.5	70.4	65.8	70.1	70.6	ne.	7.0	ne.	8.2	0.84	0.35	4.4	Cu.	e.	2.9	Cu.	e.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5h and 30m slower than 75th meridian time. *Pressure values are reduced to sea level and standard gravity.